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Production of Stainless Steel—III

STEEL

The Magazine of Metalworking and Metalproducing

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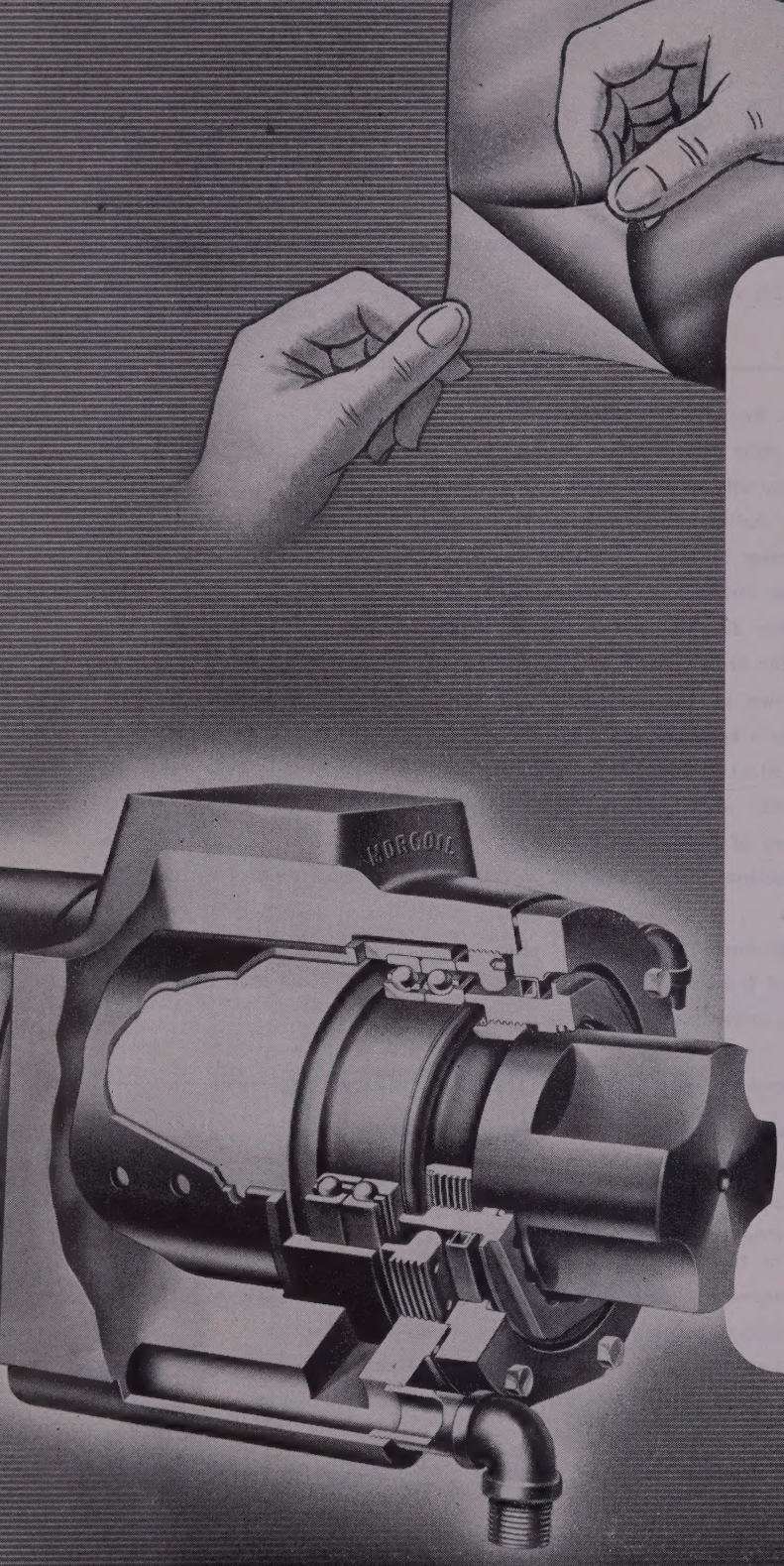

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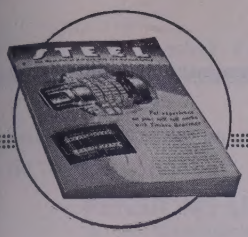

November 7, 1949

What Price Security?

Agreement by Bethlehem Steel Co. and the United Steelworkers of America-CIO on a pension and insurance package which in many respects is more liberal than the terms recommended by the President's fact finding board is a climactic event which probably will usher in a new era of labor relations for large segments of American industry.

Pensions and other forms of social security are not new by any means. Hundreds of companies have been introducing them for many decades. The significance of the Bethlehem agreement, following so closely upon the heels of the Ford Motor Co. settlement, is that it was consummated under circumstances which are almost certain to force thousands of other employers in many industries to provide similar benefits for their employees. Henceforth, for most industrial companies, pensions and insurance will become a "must," instead of a benefit bestowed upon employees on the free initiative of progressive employers.

Time alone will decide whether the "shotgun wedding" aspect of the Bethlehem agreement was a good way to launch pension and insurance plans in industrial America on a grand scale. It is a foregone conclusion that widespread adoption of plans comparable to Bethlehem's will create endless complications, some of which may be serious. It is quite probable that a year or two from now the representatives of government, USA-CIO and steel company management who were principals in the current negotiations will wish heartily that more time had been afforded to study the problem before hasty binding action was taken.

Right now the immediate problem is to resume operations as rapidly as possible after management and union representatives have agreed upon terms. Next will come the determination as to what extent the higher hourly burden will necessitate higher steel prices. Later the impact of the new agreements upon employment practices will be felt. Somewhere along the line the reconciliation of government welfare plans with those financed by private employers and employees will come up for new consideration.

In most of these pending questions lurks the danger of ever increasing government intervention in the affairs of corporations and individuals. Are we buying artificial and perhaps even false security at the stiff price of serious loss of corporate and personal freedoms?

* * *

ONLY 52 PER CENT VOTE: Tomorrow is election day. Because in most sections of the United States the issues to be decided at the polls are of local rather than national significance, the vote in relation to the number of qualified or potential voters probably will be light.

This prospect that large numbers of citizens will not exercise their opportunity or perform their duty to vote is discouraging. Even in the 1948 Presidential election, when important national issues were at stake, the total vote cast was only 47 million out of a population of more than 90 million persons with ages of 21 years or more. The vote in 1948 was less than that cast in 1944 or 1940.

Immediately following the 1948 election, many authorities attributed Mr. Truman's victory to the support given him by labor union members and farmers. More recently various studies of the 1948 vote have indicated the strong possibility that Mr. Truman won because hundreds of thousands of persons who did not favor him did not vote. The number of automobile dealers, independent grocers, members of Chambers of Commerce, doctors, dentists and even industrial-

(OVER)

ists who did not vote or who were not even registered is appalling.

Unless a higher percentage of persons who are naturally opposed to the present socialistic trend in government vote or learn to get out the vote by 1950 and by 1952, this nation certainly will follow the fate of Britain.

* * *

RAILROAD OUTLOOK DIM: A roundup of opinion as to the volume of buying by railroads in the near future shows that rail transportation executives are beset by vexing uncertainties. They have not had enough experience with the 40-hour week under normal conditions to calculate its real effect. They cannot be sure as to how seriously inroads on traffic by truck, water and air transportation will affect their business in the long run. They have suffered tremendous losses as a result of the coal and steel strikes.

In the face of these troubles, one cannot expect a cheerful prospect of rail and equipment buying by the roads in 1950. The backlog of railroad car orders dropped from 103,896 as of Jan. 1, 1949 to 22,203 on Oct. 1. Freight car awards, which totaled 1568 in January, were only 123 in September. Right now, the anticipated needs for cars, locomotives and rail for 1950 are disappointingly low.

This drab outlook could change. Check it again three or four months hence—after the devastating effects of the strikes have worn off. —p. 92

* * *

IDEAS TO LOWER COSTS: Everything that is happening today accentuates the incentive to cut costs. In a single automobile manufacturing establishment, no less than 96 technical committees are studying ideas for reducing costs. Any idea that looks promising is tested in one plant or department. If the test shows the idea is practical, it is put into effect in all units where it is applicable.

In one plant a change in containers saved a million dollars a year. In another an idea to increase tool life saved $191,000 in 12 months. In a third, a change in workmen's gloves saved $71,703 per year. One automobile company saved $1 per car by using a less complicated ignition switch.

Management never should make the mistake of thinking it has touched rock bottom on costs. Ingenuity and resourcefulness always can find a way to save. —p. 95

* * *

UNCLE SAM—BIG BANKER: Reconstruction Finance Corp. rapidly is becoming one of the country's most important lending institutions. At the end of August it had $416 million in business loans outstanding. During the first eight months of 1949 applications were made to RFC by 7078 corporations for loans totaling $958 million. RFC approved loans for 2873 applicants amounting to $383 million—an average of $133,310 per loan.

Most of the publicity attending the agency's loans centers upon loans of $10 million or more. In reality, more than 90 per cent of the loans involve less than $100,000 and many are for a few thousand dollars. Most loans are for debt retirement, working capital, plant construction and equipment. A fundamental requirement for an RFC loan is proof that the credit applied for by the borrower cannot be obtained at banks or elsewhere at reasonable terms.

At the rate these loans are increasing, some interesting and delicate questions of governmental policy are bound to arise whenever a sizable loan goes sour. —p. 88

* * *

HEAT TO AID MACHINING? At the meeting of the American Society of Tool Engineers held at Montreal last week, J. R. Roubik of Kearney & Trecker Corp., Milwaukee, and Sam Tour of Sam Tour & Co., New York, participated in a session on "hot machining."

The theory of hot machining is that if the work piece can be heated momentarily at the cutting area, the tool can remove metal faster and with less power than if the metal were unheated. Mr. Roubik experimented with a gas flame unit on a milling machine and Mr. Tour experimented with a lathe on which an induction heating unit traveled just ahead of the cutting tool.

Results of both experiments will encourage further study. Perhaps heat, as an adjunct to cutting tools, may prove to be profitable, especially in connection with hard, tough metals. —p. 86

E. L. Shaner

EDITOR-IN-CHIEF

News Summary

PENSIONS UP COSTS— Add $4 a ton to the cost of producing steel. That's what steelmakers believe the generous pension-insurance programs will mean (p. 81). Will prices go up? Producers hope not. If they do, increases likely will be made on a product basis, not across the board. Chances for downward price adjustments in steel and many metalworking products—in sight last summer—probably have been scuttled by the social benefit settlement . . . Metalworking companies with low steel stocks may face poststrike curtailments. (p. 82) . . . The coal stoppage now becomes the No. 1 obstacle to resuming a high level of industrial production.

STEEL EXPANSION— Look for moderate expansion in the steel industry during the 1950s, but nothing like the growth of the 1920s when capacity increased by about 25 per cent. An output of 100 million tons is readily conceivable for certain years in the next decade, but not as an average for the entire ten years, says Walter S. Tower, American Iron & Steel Institute. Latest individual expansion programs (p. 83) are planned by Lone Star Steel Co. and Portsmouth Steel Corp. Lone Star will build a $52.5 million mill in eastern Texas. Portsmouth will install a hot-rolled sheet and strip mill and an electric weld pipe mill at Portsmouth, O. Detroit Steel Corp. will acquire Portsmouth's physical assets and business Jan. 1, 1950.

U. S. CAPITAL FOR INDUSTRY— A $36 million loan from Reconstruction Finance Corp. enabled Lone Star to schedule its expansion. The government is gaining as a source of capital for business and industry (p. 88). Since the first of the year, the number of RFC loans approved has more than doubled; dollar value of the grants has more than tripled. The agency had $416 million in business loans outstanding on Aug 31.

PENSION FUNDS AS CAPITAL SOURCE—Watch for still another development in the matter of sources for industrial capital. Delegates to an American Institute of Steel Construction meeting heard (p. 84) that the funds accruing in large union-won pension programs may become an important origin for investment dollars. This and other factors assure adequate mortgage money for the next few years. All types of construction this year will reach a record peacetime total of almost $19 billion.

CAPITAL EQUIPMENT—The business skies are partly cloudy but clearing up for capital equipment makers (pp. 86, 87). Machine tool sales to small shops are increasing. The outlook is promising when this round of strikes is over because industry then will more than ever need cost reducing equipment. But you will have to fight harder for capital goods business in Canada as Britain drives for Dominion markets.

RAILROADS—If all or part of your volume is dependent upon railroad purchasing, your outlook is uncertain (p. 92). Railroads are moving cautiously in ordering equipment and supplies because it is unusually difficult now to estimate the transportation future. This is the case because of the new 40-hour week, competition from other forms of transportation, labor's demands and loss of revenue from the coal and steel strikes.

COST REDUCTION— Automakers are plugging up compressed air line leaks, switching work gloves, doing anything to cut costs and offset a labor bill which has more than tripled since 1939 (p. 95). Progress in the drive is indicated by the fact that motor vehicle prices have risen only 93 per cent since 1939 while average weekly wages climbed 130 per cent.

HERE AND THERE IN INDUSTRY—A major overhaul of patent laws is likely in the next session of Congress (p. 90) . . . Kaiser-Frazer is beginning to tool up for its new light car (p. 95) . . . The new nodular graphite gray iron promises to expand the gray iron industry (p. 87) . . . European industry must do more research (p. 91) . . . The dictating machine industry is now doing a $25 million to $30 million business, 270 per cent greater than the 1939 total (p. 85).

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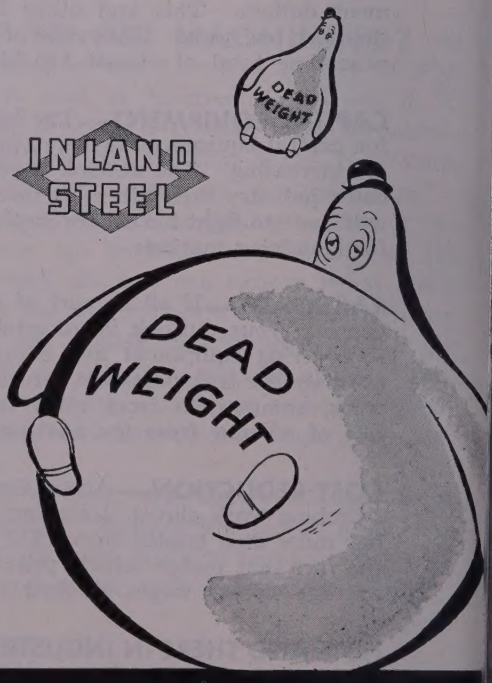

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udy Pension Impact on Costs

Steelmakers see social benefit settlement costing $4 per ton of finished steel. Hope to avoid general price increase. Smaller companies in quandary

I have to pay more for steel? s the question troubling metal- ng executives as they study the n-insurance settlements being t to end the 5-week steel strike. elmaking costs of the large producers will rise about $4 per f finished steel on the average sult of the added cost of the security benefits granted. For companies the increase will be antially more. For those com- s which already had pension pro- s, the increase may be less.

l the producers be able to ab- he increase, or will they pass it to consumers? Steelmakers ary of making firm predictions. say unofficially they hope to any general increase in prices, renewed attention will be given st cutting in an attempt to hold s down.

increases in steel prices do e necessary, such adjustments bly will be made on a product rather than across the board.

ters Fact-Finders' Plan — Cost e pension-insurance settlements e higher than the settlement rec- ended by the steel fact-finding which suggested the companies $200 a year per worker (10 cents per hour on a 2000-hour year basis) for the purchase of insurance and retirement benefits. Although estimates of the cost of the packages now being granted vary widely, representative agreements for the larger companies are figured at around 12 to 14 cents an hour.

May Set Pattern—The steel agreements are interpreted as establishing a pattern for company-financed social security benefits which may filter down through the metalworking and other industries.

Complexities of the pension settlements delayed a quick ending of the strike.

Following the announcement of the Bethlehem agreement Oct. 31, other companies called in their actuaries and pension consultants to restudy figures for their companies in light of the Bethlehem agreement.

Smaller Companies Demur — A number of the smaller companies protest that the pattern established by the larger companies will not fit their situation at all. They contend they cannot afford the generous benefits, that many of them lost money in the third quarter even though operations were at a fairly high level. They insist that differences in size, methods of operation and financial history must be taken into consideration.

The Bethlehem Plan

Bethlehem's agreement with the United Steelworkers provides for noncontributory pensions and contributory social insurance. It represents a compromise in the prestrike positions of both the union and the industry.

Bethlehem's settlement is effected through amendments to the company's 26-year-old pension program, a noncontributory plan which provided $50 monthly pensions. Under the amended plan, Bethlehem workers with 25 years of service will receive a minimum of $100 a month, including federal social security. Workers with 15 years or more of service will receive proportionately lower benefits.

No Maximum—Basic formula used in computing pensions under the Bethlehem agreement: One per cent of worker's average monthly earnings for ten years preceding retirement multiplied by the number of years of service, plus his social security benefits. The plan places no upper limit on pensions. If federal social security benefits are increased, workers entitled to more than the minimum pension will benefit.

Insurance Cost Shared—Workers and company will share equally in the cost of a social insurance program, estimated at 5 cents an hour. This represents a compromise by the union which earlier had insisted on noncontributory insurance plans.

Pension Cost Unknown—No ac-

PRESIDENT MURRAY GETS A BREAK AT CIO CONVENTION
. . . . in timely announcement of Bethlehem pension settlement

curate estimates of the cost per man-hour for pensions under the Bethlehem plan are available. Mr. Murray estimated that it might be between 10 and 12 cents an hour. So many variables exist in pension planning that exact estimates are impossible.

Independent actuaries agree that the total cost of pensions for steelworkers under the Bethlehem plan will exceed—and possibly double—the 6-cent an hour estimate originally made by union consultants and adopted by the steel fact-finding board.

And Now the "Hangover"

The worst may be yet to come. That's the feeling of metalworking executives who expect further production curtailments for lack of steel.

Some metalworking companies already have cut back operations because of dwindling steel supplies. Immediate resumption of steel production would not start the flow of material in time to prevent curtailments by an even greater number of consumers.

Here's why: The first material to reach a consumer after a steel strike settlement may not be what is most critically needed. All steel mills will not resume work at the same time. While facilities at some mills remained in good condition during the strike, the facilities at others, particularly older equipment, did not hold up. Evidence of this was the collapse of some open-hearth roofs.

Coal Is Problem—Even if steel mills do get back into production, some of them may soon feel effects of the long work stoppage of the coal miners.

Although some consumers have had to curtail production because of their dwindling supplies of steel the curtailments have not yet been widespread since the bulk of metalworking plants (as reported in STEEL, Sept. 19, p. 46) had from 30 to 60 days' supply of steel when the steelworkers' strike began Oct. 1. Companies holding more than a 30 to 60 day supply far exceeded those holding less.

Automakers Curtail—Plans of automobile companies for suspending assemblies because of short supplies of steel were left generally unchanged by the Bethlehem Steel Corp. strike settlement:

Ford—Bethlehem is its major supplier—still plans to stop most manufacturing operations Nov. 11, final car and truck assemblies the following week. Chrysler made no change to halt assemblies of its Dodge, DeSoto and Chrysler cars at the end of last week and of its Dodge trucks this week. Suspension of Plymouth assemblies is still expected around Thanksgiving Day. Chrysler points out that it buys steel from many different firms and that until all are back it will be impossible to make plans for resuming production. General Motors Corp., which buys only a small proportion of its steel from Bethlehem, still expects a slowing down of operations. Plans of Nash-Kelvinator to suspend car assemblies about the middle of November at its plant at Kenosha, Wis., still stood.

More Shutdowns Expected — Other independent auto companies are expected to be able to run until late this month. Some interruption of assemblies can hardly be avoided at that time even if all steel companies resume operations soon. Time needed for finished steel to move from the mill through the parts makers' factories and the auto companies subassembly departments to the final assembly line is usually estimated at from four to six weeks.

Other companies cutting production include: Oliver Corp., from five to four days at Charles City, Iowa, and Springfield, O.; Seeger Refrigerator Co. down to three days at Evansville, Ind.; General Electric Co. which suspended refrigerator output at Erie, Pa.; Maytag Co. which cut Newton, Iowa, washer plant from 53-hour week to 40-hour; General Motors Delco Products Division at Dayton, O., down to four-day week; and Midland Steel Products Co., Cleveland, effecting a gradual reduction.

Coal Now Big Worry

The coal miners' strike may become the No. 1 worry of the metalworking industry. After se months of coal miners' work pages, the nation's stocks of have been reduced to a point be which further shrinkage will i a slow freeze on steel production other industrial operations.

Pointing up the seriousness o coal situation is the statemen Leigh Willard, chairman, Inte Iron Corp., Cleveland, that his pany, although having had a stock of coal, is now being force slow down and that a continued up at the mines for another wee ten days would lead generally t very critical situation."

At Youngstown steel mills only two weeks' supply of coal

Coal stocks among steel produ in the Pittsburgh and Wheeling tricts vary from 40 to 55 day near capacity operations. Thi adequate to prevent mill shutd if the coal strike is ended this m

At Detroit, coal stocks of Lakes Steel Corp. and Ford M Co. are ample to support steel o tions through the winter.

October Jobless Increase

Secondary unemployment resu from the steel and coal strikes the October jobless to 3,576,000, 000 higher than in September. civilian employment last month 59,001,000, 410,000 below Septem level, Commerce Department sa

U. S. Offers Pension Report

"Pension Plans" is the titl a 140-page mimeographed report compiled by the Division of Indus Relations, Bureau of Labor Stati Labor building, Washington.

CIO Launches Three-Way Drive Against Communists

The CIO in its Cleveland convention last week ousted the lefti United Electrical Workers, formed a new group and gave it the juri diction formerly held by the old UE, barred left wingers from its t executive board.

Formally kicked out of the CIO with the old UE, which claims membership of 450,000, was the Farm Equipment Workers, anoth leftist group which merged its claimed 60,000 members with the U in defiance of CIO instructions that it amalgamate with the Unite Auto Workers.

The new UE will be officially called the International Union Electrical, Radio and Machine Workers-CIO. Initially, it will be r by a 12-member committee headed by James B. Carey, CIO secretar treasurer, who was president of the old UE until ousted in 1941 by Communist-dominated clique. The new union will have its organizati meeting Nov. 28 in Philadelphia. Mr. Carey says his group will sta with a nucleus of 230,000 members in locals who have seceded or w secede from the old UE.

Convention action denies membership in the CIO's top governi body to Harry Bridges, head of the International Longshoremen's Unio Ben Gold, leader of the Furriers Union, the only board member w admits he's a Communist; and a few others.

ne Star Builds Mill

$52.5 million steel plant will e constructed in eastern Texas. FC to help finance it

E Star Steel Co., Dallas, will l a steel mill in eastern Texas. iled plans and specifications are g released to prospective bidders. timated construction cost is $52.5 on for a plant to include four ton open-hearth furnaces with an al steel ingot capacity of 500,000 ; one 110-in. slabbing mill; one -high 72-in. reversing hot-strip and a line for manufacture of 00 tons per year of electric-weld up to 16 in. in diameter.

ne company has a commitment t Reconstruction Finance Corp. a first mortgage loan of $36 mil- toward the financing of the proj- Additional funds for operating tal during the construction period been arranged for from local ks. Suppliers of equipment and ractors interested in doing the truction have indicated a willing- to take a portion of their money ong-term debentures.

ne Star estimates that when the facilities are completed, its total erties will be worth more than million.

up Leases Apollo Mill

ne old Apollo, Pa., sheet mill fa- es will resume operations Nov. 7 r the name of Whitney-Apollo . These facilities recently were to M. N. Landay Co., Pittsburgh, h is leasing the mill to Whitney- llo. Interests behind this latest t to start up the old Apollo mill said to be three former members ne Phoenix-Apollo syndicate.

onthly capacity represents 10,000 2,000 tons of hot-rolled sheets, e galvanizing facilities are ca- e of about 4500 tons monthly. ngements have been made to hase sheet bars from Portsmouth l Corp. and Empire Steel Co. It timated about one-quarter mil- dollars will be necessary to put hand sheet mills back into op- on. About 600 steelworkers will mployed.

Iron Rate Higher

ST FURNACE operations edged o 75.1 per cent of capacity in ember from 74.7 per cent in Au- , but the output tonnage dropped use of the shorter month. Sep- er's production was 4,351,155 , second lowest total this year. ded in the total are 4,307,747 tons of pig iron and 43,408 tons of ferromanganese and spiegeleisen.

RECORD: This open-hearth department of Weirton Steel Co. set a world's record last month. Its 12 open hearths produced 200,379 ingot tons. Best previous output was 182,772 tons also turned out by the National Steel Corp. subsidiary, in March, 1949. Weirton began operating a giant 550-ton open hearth in September. The company, whose workers have an independent union, was not struck in October, normally a peak production month

In the first three-quarters of this year blast furnaces have operated at 86.5 per cent of capacity to yield 506,706 tons of ferromanganese and spiegeleisen and 45,136,368 tons of pig iron for a grand total of 45,643,-074 tons. The monthly average which has been on the decline in the last few months will take a sharp drop in the next report because most producers were shut down by the strike for all of October.

District blast furnace production in September and for the first three-quarters of 1949 follows:

	——Net Tons——	
District	September	Nine Months
Eastern	835,416	9,035,850
Pittsburgh—Youngstown	1,589,403	17,017,739
Cleveland—Detroit	447,266	4,555,792
Chicago	968,078	9,735,072
Southern	348,985	3,529,076
Western	162,007	1,769,545
	4,351,155	45,643,074

Record Output for Armco Plant

A NEW alltime high record for steel production was set in October by Armco Steel Corp.'s East Works, Middletown, O., says L. F. Reinartz, assistant vice president.

This was made possible by the combined output of the electric melting department's biggest monthly tonnage to date and a near-peak output by the open-hearth department. During the month when most of the country's steel plants were strike-bound, the Armco East Works made about 1000 more tons of ingots than ever before.

Portsmouth Steel Sold

To Detroit Steel Corp., effective Jan. 1, 1950. Ohio producer to expand finishing units

DETROIT Steel Corp. will acquire the physical assets of Portsmouth Steel Corp. Jan. 1, 1950. The agreement calls for expansion of Portsmouth's present finishing facilities.

Portsmouth's properties include steel producing units at Portsmouth, O., and two coal mines in eastern Kentucky. The Portsmouth works include 108 by-product coke ovens, a blast furnace and ten open-hearth furnaces which have an annual ingot capacity of 720,000 tons. This is supplemented by a blooming mill, billet, rod and wire mills and equipment.

Detroit and New Haven Plants—Detroit Steel operates cold-rolled strip mills at Detroit and New Haven, Conn., with a combined annual capacity of 210,000 tons. Its Reliance Steel Division processes and distributes flat-rolled steel products. Its Craine-Schrage Steel Division operates a steel warehouse in Detroit.

The facilities, management and personnel of Detroit Steel and Portsmouth Steel will be consolidated into a single corporate unit, without interrupting the continuity of Portsmouth's operations. The 1948 sales of the two companies aggregated $88,639,000.

Portsmouth Expansion—The agreement contemplates expansion of finishing facilities at the Portsmouth works through installation of a hot-rolled sheet and strip mill and an electric weld pipe mill. The hot mill will produce hot bands for the cold-rolled strip mill at Detroit and skelp for the new pipe mill at Portsmouth. The Ohio river location of the Portsmouth works provides ready access to major pipe markets of the Southwest. The new mills are scheduled for completion late in 1950.

Portsmouth was formed in 1946 when it acquired Kentucky coal properties and Ohio steel facilities from Wheeling Steel Corp. Part of Portsmouth's original financing was provided by Kaiser-Frazer Corp. which was seeking a steel supply. K-F disposed of its Portsmouth holdings in mid-1948. Present deal must get stockholder approval.

Boost to Building

More financing seen through industry pensions, a source of mortgage money

BROAD industry pensions would provide an important source of mortgage money for new building operations. Coupled with other factors this money assures plentiful financing for new construction, said Earl B. Schwulst, president of the Bowery Savings Bank, New York. He spoke at the American Institute of Steel Construction convention in White Sulphur Springs, W. Va., Oct. 31-Nov. 3.

If union-won pensions become widespread in industry, large funds will eventually accrue. Administrators of this money will seek investment opportunities, particularly in capital construction.

Immediate Outlook Good—The immediate outlook for capital is also good, said Mr. Schwulst. From new money alone the four major types of savings institutions will have about $7 billion to put to work in the next year. Reserves of private insurance companies are increasing at $3.5 billion a year and shares in savings and loan associations by about $1.6 billion annually. Time deposits in commercial banks and savings bank deposits combined also are increasing at $1.6 billion annually.

The building industry is partly insulated against future deflationary conditions, Mr. Schwulst believes, by planned government spending on public works. Government - subsidized housing will become more important.

Industry Not Strike-Crippled—The steel strike failed to cripple building operations in October, N. R. Patterson, institute president, reported. But the strike will cut steel fabricating shop bookings below the 2 million tons fabricated in 1948. So far most of the 50,000 workers in fabricated structural steel have been kept on the job because of large steel inventories.

Mr. Patterson cites these bright spots in construction outlook: Revival of skyscraper office building; many housing developments financed by insurance companies and banks; increased construction of steel bridges —2000 are now being built or were just completed; sport stadium construction; airport building. High costs constitute the major danger to large industry volume. Contracts for hospitals, schools, churches and low-priced housing are still scarce.

The Long View

FINANCED by the $60 life-savings of his friend, Capt. Henry Lomb, John J. Bausch opened a small optical shop in what is now the Reynolds Arcade Bldg. in downtown Rochester, N. Y. That was 96 years ago last Tuesday.

Today, on the threshold of its 97th year the company is known as one of the world's leading producers of scientific optical instruments.

During the Civil War Captain Lomb kept sending his Army pay to keep the company going while John Bausch built and installed the first American power lens grinding machine.

Construction Peak Seen

Construction this year will reach a record peacetime total of almost $19 billion, says Dwight W. Winkelman, president of D. W. Winkelman Co., Syracuse, N. Y., and immediate past-president of the Associated General Contractors of America.

Speaking before a meeting last week of the American Society of Civil Engineers, he said that even this expenditure is not meeting construction demands in many fields. Need for more highway and airport construction is pressing. Construction costs are stabilizing or declining slightly on a national scale. They are now about 10 per cent below the postwar peak of last fall. Contractors report adequate supplies of materials, machinery and manpower. Productivity and efficiency have increased, competition is keener.

Boomlet Bloom Fades

The boomlet in general business reported by purchasing executives in August and September petered out in October. The full impact of the coal, steel and aluminum strikes has not yet been felt by all industry, says the National Association of Purchasing Agents.

Should the mines and mills go back to work at once, the supply line vacuum already created will slow many manufacturing operations for several months before production of the basic materials can fill the postponed order schedules.

In October, the production increases of the previous two months were shaved down 14 per cent. Back-order positions declined to about the July figures. Prices for the most part remained steady. Purchased inventories continued to drop overall, although 22 per cent reported increases, the highest number since June, 1948. Re-employment has slowed down. Buying policy is cautious and of short range.

Washer Sales Mount

Manufacturers of household w ers sold more units in September at any time since October, 1948

Washers sold in September to 357,281, an increase of 10.3 per over August's 323,789, says Ame Home Laundry Manufacturers sociation. September sales ran per cent behind September, 1948 industry's alltime high month. pared to September, 1941, wa sales in September, 1949, were u per cent.

Manufacturers sold fewer ir in September than in August. tember ironer sales totaled 27 compared to 32,300 sold in Augu drop of 14.2 per cent and 25.7 cent below September, 1948.

Television Demand Not Me

About 265,000 television rece were produced in September. Of number, the Radio Manufacturer sociation says its member comp turned out 224,132 sets in the work-weeks of September, comp with 185,706 in the five work-w of August.

Both television and radio set duction is running behind den RMA members made 1,402,840 vision receivers in the first months of 1949, more than times the number during the 1948 period. The total output o receivers in the last four years timated at more than 2,750,000.

Electricity Needs Soar

Nation's electric utility ind will see the greatest demand in tory for electric power this w with a margin of 11.5 per ce spare.

This margin of generating c ity over maximum anticipated mand for electricity is the la since the 12 per cent margin of It compares with a reserve of 5.9 per cent last December an per cent at the end of 1947. summary is contained in Edison tric Institute's semiannual surv the power situation.

There is no expectation of power curtailment in the natio cept in the Pacific Northwest w low river flow has reduced hydr tric operations. By the end of the normal generating reserve c ity of 15 per cent is expected reached.

Sees Upturn in Copper, Bra

Fourth quarter business of the per and brass industry will show stantial improvement over third ter and this higher level of ac will continue into the first

s of 1950, Roger E. Gay, pres- Bristol Brass Corp., Bristol, predicts.

Gay estimates fourth quarter ents at 480 million pounds, com- with actual third quarter ship- of 376 million pounds and 541 n pounds for the last three s of 1948.

Gay looks for a slight dip in ss late next spring but expects 950 copper and brass shipments exceed the estimated total of million pounds for 1949. Due to p in business early this year, 49 volume was off considerably the 2150 million pounds shipped 8.

nsion Below 1948 Pace

ustrial investments totaling $5.9 n were announced in Chicago ; October, compared with $16.5 n a year ago. Chicago As- ion of Commerce & Industry his total will be spent for new ngs, additions and land and ng acquirement by 22 compan- cluding three newly organized

nt outlay amounts to $87.8 mil- n the first ten months of this In the like period of 1948 the was $131 million.

ing Boom in San Francisco

er prices for new homes are ng construction in the San isco area. Prices have dropped 8 per cent since last spring. s are rushing to take advan- of the decline for they fear it e only temporary.

ober construction ran about 30 nt above that a year ago. Most homes are selling for less than 0.

uctions in the costs are at- ed to greater efficiency of la- better planning, more competi- mong subcontractors.

s Manufacturing Grows

wth of manufacturing facili- n Los Angeles county is pro- g at a rate far more rapid ast year.

ording to the Industrial Devel- nt Committee of the Los Ange- Chamber of Commerce, plant uctions and expansions during rst nine months of 1949 totaled million.

s is an increase of 38 per cent he $58.1 million for the same last year.

's year's total includes 145 new ies, among them three national facturing firms which trans- their headquarters to Los An- and two others which opened n branch plants there.

Even scouting notes at football games are recorded as . . .

Dictating Machine Applications, Sales Increase

"TAKE a letter, Miss Smith." This remark, or something like it, has been voiced with increasing frequency since 1837 when shorthand was invented. It will be heard even more now that Miss Smith is getting mechanized.

She is receiving help from an industry manufacturing $25 million to $30 million worth of dictating and voice recording equipment yearly. This volume is 270 per cent greater than the 1939 total, will increase even more in 1950.

Cost-Cutting—The cost-cutting potentials in voice recording equipment account for spectacular sales gains. There are 30 times more office employees than 50 years ago, only seven times more manufacturing workers. Tests show that a man, who supposedly takes an hour for dictating to a stenographer, actually spends only 15 minutes in dictating, the other 45 minutes in ruffling through papers, answering the telephone and dealing with other interruptions.

Machines today are lighter, more compact than a year ago. They can be used on an automobile battery, in hotel rooms, at home, even at football games (see cut.)

Improved manufacturing techniques have held production costs generally to slightly below what they were a year ago. Producers make most of their own parts.

Remote Ancestor—The granddaddy of most types of dictating machines today is a sound-recording device developed by Thomas A. Edison in 1877. Up until the late 1930s the entire dictating machine industry was built on mechanical acoustics—a speaking tube carried the voice down to actuate a small diaphragm which recorded on wax cylinders. Dictaphone Corp. and Thomas A. Edison Inc., producing this type, were alone in the field until application of electronics to recording equipment broadened the industry.

Now manufacturers of electronic dictating machines use various methods of recording media—wires, tapes, disks and cylinders. A postwar research and development program has brought a host of new refinements in the past year which have increased acceptance of mechanical dictation.

Bank Machine Introduced

Burroughs Adding Machine Co. introduced a new bank accounting machine last week at the American Bankers Association convention in San Francisco.

The device is designed to help handle a bank bookkeeping job that has doubled in the past ten years. Almost 2.5 billion checks were written against the 85 million checking accounts in the U. S. last year, about double 1938 volume.

The working surface of the Burroughs machine consists essentially of a number keyboard flanked on the right by three controls, labeled "checks," "deposits" and "balance." The machine automatically selects the proper columns on the customer's statement, prints the date, counts checks, tells the operator if the customer has overdrawn and by how much and computes and prints the new balance.

British Drive for Canadian Markets

Expand capital goods sales effort in Dominion, with government backing. Warehouses to carry stocks of tools, parts in effort to match American service

SUPPLYING goods or equipment to the Canadian market? If so, be ready for intensified competition from British firms.

This warning was issued by Victor M. Drury, president and chairman of the executive committee, Canadian Car & Foundry Co., Montreal, speaking at the American Society of Tool Engineers meeting in Montreal Oct. 27-29. His remarks were primarily about machine tools because of the composition of his audience, but apply equally to other capital goods.

Speaking of the machine tool situation, Mr. Drury said: "We Canadians long have been good customers of the American machine tool industry, but now it looks as though you men will have to fight harder for our business. British engineers are on the eve of a fierce drive for Canadian orders.

"On Oct. 20 London announced that the British government is getting behind the engineering industries in this development. Let me assure you that the British are deadly serious. Months ago the British sent a delegation to Canada to survey our market. It was, perhaps, the grimmest group of business men from the other side that we have yet greeted."

British Mean Business—The British say Canadians turn too much to the U. S. for engineering equipment, Mr. Drury continued, and intend to change this picture. Canadians will be assaulted by a corps of top-flight salesmen to be permanently located in the Dominion. These salesmen will be supported by warehouses carrying large stocks of machines, tools and repair parts to match American builders in speed of delivery and service on machines.

Emphasis during the meeting's technical sessions was on economical tooling for short run production, a problem which prevails in Canada because of limited markets as compared to the U. S. Many of the suggested solutions are also important to small and medium size shops in this country.

Special Tools from Standard Units—One solution to this problem is building up special machine tools out of standardized units which can be reassembled to suit other jobs when a limited run is finished. This practice is recommended by C. P. Farr, chief engineer, Modern Tool Works Ltd., Toronto, Ont. To illustrate this theory, Mr. Farr used slides of a nine-way drilling and reaming machine, a drilling and spot facing machine and several others tailored to suit certain jobs but adaptable to others.

Something new in machine shop practice and a source of considerable interest at the meeting was the session on "hot machining" conducted by J. R. Roubik, Kearney & Trecker Corp., Milwaukee, and Sam Tour, Sam Tour & Co. Inc., New York.

Faster Cutting with Less Power—The theory behind hot machining is that cutting involves heating action; if the work piece can momentarily be heated at the cutting area, the tool can remove the metal faster with less power. Mr. Roubik's experiments have been conducted on a milling machine equipped with a gas flame heating unit. Mr. Tour has done his work on a lathe with an induction heating unit traveling just ahead of the turning tool. Results in both cases encourage belief that heat as an adjunct to cutting tools be in the offing, especially in nection with hard, tough mat

Rubber Ruler

AN AUSTRIAN refugee n living in Hartford, Conn., year-old Joseph Gerber, has vented a variable scale wh professors and industrial m call the most revolutionary gineering aid since developme of the slide rule in 1620.

The device is 12 inches lo made of anodized aluminu It's fitted with a triangular spring which, when extended contracted, spaces intermedi points proportionately. Fu compressed the spring has markings to an inch.

Used in relation to fixed sic scales, it solves problems spacing, proportion, interpo tion. It multiplies or divi distances, enables reading blueprints that have shru permits engineers to use a desired scale, translates system of measurement i another. It's not a slide r is not intended to replace o The "rubber ruler" is sold Gerber Scientific Instrum Co., Hartford.

Machine Tool Sales Up, Future Promising

MACHINE tool sales are picking up, particularly to smaller shops. This is the "state of the union" situation reported at the 25th annual meeting of the American Machine Tool Distributors Association in Cincinnati, Oct. 31 and Nov. 1.

The future holds promise, AMTDA believes, of even larger volume when this round of labor trouble is over. Then, industry big and little will more than ever need cost-reducing tools.

The growth of the machine tool and press manufacturing industry is indicated in the expansion of AMTDA which, from a small beginning in 1924, now has over 150 members.

Taft Speaks—Sen. Robert A. Taft (Rep., O.), who spoke at the convention, said American capital equipment expansion is being throttled by government's double taxation of industry. Corporations must pay high taxes, then their employees have to ante still more on their earnings from the corporations. The first step to stimulate industry to continue its traditional growth will be to make a cut in corporate taxes. This should be followed by a cut in individual levies. Senator Taft also advo more liberal laws for obsolete ment. Even in Great Britain, ultraconservatism on such m supposedly rules, machine tools be written off for taxation pu at the rate of 40 per cent per y

Johaning Elected—At the clo the meeting Robert L. Giebel, dent, Giebel Inc., New York, h over the gavel to O. W. Joh president and general sales ma Colcord-Wright Machinery & S Co., St. Louis, who was elected 50 president of AMTDA. Othe officers are E. B. MacDonald racuse Supply Co., Syracuse, as first vice president; E. J. Se of Seifreat-Elstad Machinery Dayton, O., as second vice pres and George B. McClennen of Equipment Co., Philadelphia treasurer. Thomas A. Fernle 505 Arch St., Philadelphia, con as executive secretary.

Rising Tool Sales Forecast

Rising sales curve for the m tool industry is forecast by L. I Donald, vice president, Warr Swasey Co., Cleveland, and pre

onal Machine Tool Builders As-tion. He told a conference of ner & Swasey district managers peacetime competition and re- of buyers' markets provide the ion to the problem of war sur- machine tools,

says that up to now the na-s metalworking plants have been ating "for the most part with machine tools which are out-duced by today's models." More half of the plant equipment used y was built prior to the war and of the remainder is of wartime ge representing engineering de- frozen almost ten years ago. e machines are no match for ent models, Mr. McDonald con-s, and there would be an up- trend in machine tool sales to-if it were not for hesitation due urrent strike situations.

pany Celebrates 75 Years

ncinnati Bickford Tool Co., ey, Cincinnati, O., manufacturer pright, jig boring, and radial ng machines, announces its 75th versary by transmitting to the ine tool trade an anniversary r and a direct reading power e.

e "Direct Reading Power Chart Drilling Time Indicator" provides venient time saving, pocket-size l calculator for use in estimat-nd engineering departments.

ECA Listing for Small Firms

YOU are a "small independent prise" and want to get busi- under the Marshall Plan, you ntitled to free listing in a di-ry to be compiled by the Eco-c Cooperation Administration.

e directory, printed in the lan-es of the various participating ries, will be distributed by ECA. l firms are asked to register Nov. 10-30. Application forms available at Commerce field of-

es Raise, Introduce 58 Taxes

EPING changes in 52 import-axes were made by state legis-es in 1949. All the changes were rd, says Commerce Clearing , Chicago. Six states tapped ources of revenue by new taxes.

1949 State Tax Changes

One of Taxes	Number of States Increased	New
Sine	15	0
ets	9	2
r	10	1
nal income	8	0
rate income	6	0
gross income		
or use	4	3
	52	6

Nodular Iron Output Up

New cast product promises to expand gray iron industry, society told at Chicago meeting

INCREASED production of nodular graphite gray iron next year will permit more engineering components to be made as castings. This new cast product promises to expand the industry, speakers told the Gray Iron Founders' Society meeting in Chicago, Oct. 27-28.

Nodular iron will not replace much gray iron or any other foundry metal, said Charles Donoho, American Cast Iron Pipe Co., Birmingham, but it will enable more products to be cast. Nodular iron provides a metal for castings which require properties between those of gray iron and steel. The society's committee on nodular iron warned that its production needs close laboratory control.

Activities Outlined — Other activities of the society were outlined, including sales promotion, work in progress on the gray iron handbook, the technical program, changes in terms and conditions of sale, publication of cost manual, completion of the annual wage rate survey and inauguration of a safety program.

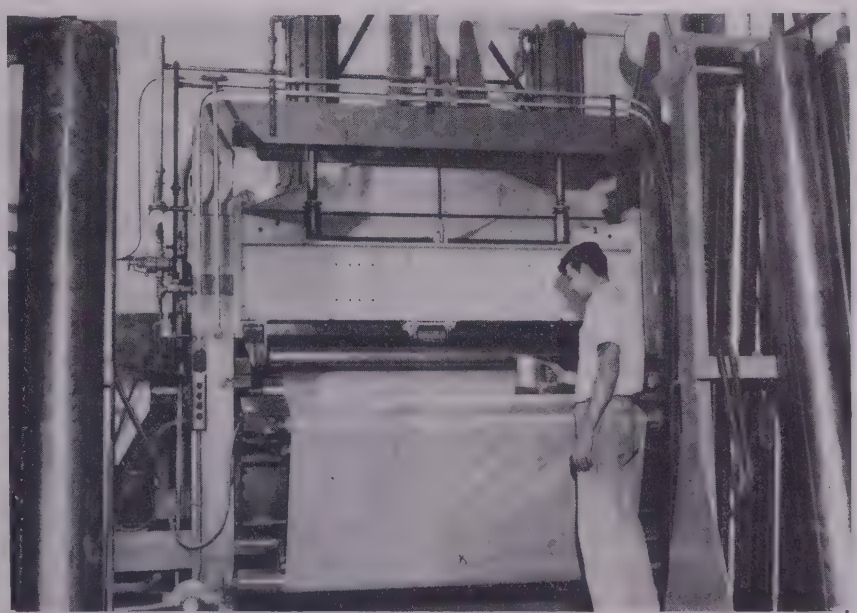
Speakers at the meeting told society members to move slowly in the study of pensions. Everett M. Dirksen, Pekin, Ill., a former congressman, deplored bigness in industry and government. Both can become so large that they pass optimum point of efficiency.

Officers Elected—Society officers re-elected are: President, Hermann P. Good, superintendent, Textile Machine Works, Reading, Pa.; secretary, Robert G. Schaefer, board chairman and treasurer, Schaefer-Goodnow Foundries Inc., Pittsburgh; treasurer, Henry J. Trenkamp, president, Ohio Foundry Co., Cleveland; executive vice president, Raymond L. Collier, Cleveland. Newly elected as vice president was H. L. Edinger, president, Barnett Foundry & Machine Co., Irvington, N. J.

Elected to the board of directors were: George R. Holmes, McIagon Foundry Co., New Haven, Conn.; R. W. Foster, Bay City Foundry Co., Bay City, Mich.; E. B. Christensen, Paxton-Mitchell Co., Omaha, Nebr.; E. N. Harrison, Harrison Foundry Co., Chattanooga, Tenn.; and J. Scott Parris Jr., Richmond Foundry & Mfg. Co., Richmond, Va. Mr. Good was re-elected to the board.

Students Given Job Outlook

SOME 800 engineering seniors of the University of Wisconsin got their first look at today's engineering job opportunities when the university held its first Job Engineering Forum on the campus.



REHABILITATED: Developed for making wartime "Bazookas," this machine is now being used for manufacture of power transformers at the General Electric plant in Oakland, Calif. Only slight alterations were made to adapt the machine for making paper cylinders on which transformer coils are wound. It's all part of a $2 million modernization program at the GE plant

Windows of Washington

By E. C. KREUTZBERG *Washington Editor*

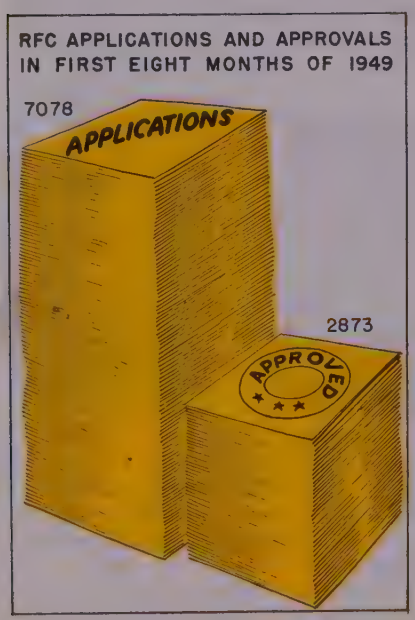
Government gains as a source of capital. RFC is not governed by same factors as banks are in making loans. Small companies have 1 to 2.5 chance to get money

QUIETLY but inexorably the government is gaining as a source of capital for business and industry.

The trend is particularly pronounced so far this year. Since Jan. 1, the number of loans approved by the Reconstruction Finance Corp. has more than doubled; dollar value of the loans has more than tripled. RFC had $416 million in business loans outstanding at the end of August, which places it high among the country's biggest lending institutions.

But That Isn't All—With the growth of its lending activities has come a profound change in the government's policy on business loans. The principal objective in the past was to stabilize the economy by getting behind private lending concerns. RFC loaned out billions in the great depression of the 30s to promote recovery. The money was advanced largely to banks so they could liquidate their positions; after that banks were able to resume their old function of taking care of the financial needs of the community. But this year the new trend—approving huge loans which banks will not make because they believe the risks are too great—is pronounced.

The record seems to warrant this conclusion: If you want to launch a big new industry, if you are in distress, or if you need money for expansion—and a bank won't extend financial aid—you have at least an even chance of being able to get the money from RFC.



You don't have to seek far for the explanation of this loan policy. RFC is not guided in its business loan policy by factors which must be considered by a private banker. RFC does grant loans in accordance with requirements set by Congress.

If you want to borrow money from RFC, you must meet these requirements: You must show that the credit applied for is not otherwise obtainable on reasonable terms; you must satisfy the RFC that there is reasonable assurance of repayment; and you must show that the loan will contribute to the maintenance or increase of production and employment.

That's All There Is to It—If you encounter resistance, a call from one or more congressmen or from an administration brass hat, explaining that a loan would be in the public interest, often seems to help. And that is no reflection on RFC, which is manned by men of high character and ability. But they have to remember at all times that theirs is a public institution set up by Congres with a specific mandate. When a loss turns up they are in the clear as long as they can show the money was loaned in the public interest.

What happens when you do not repay your RFC loan? Like any other lending institutions, RFC sends experts to your plant in an effort to help you straighten out your affairs. The worst that can happen if you can't pay up is to be liquidated.

What would happen if some of the large outstanding loans went sour? Would the government step in and take over the plants and operate them? Those questions have been speculated. In view of the magnitude of some of the loans, future policy in regard to plants in insolvency proceedings bears watching.

Many Loans Are to Small Business—While the big RFC loans make the headlines well over 90 per cent of RFC's loans involve less than $100,000. Many of them are for a few thousand dollars. Any small company, as shown by the ratio of loan applications to approvals, has a 1 to 2.5 chance of getting money from RFC. Most loans are for these purposes: Debt retirement, working ital, plant construction and equipment. The number of companies applying for RFC is increasing by leaps and bo Here's how they grew in the eight months of the year:

1949	Applications Made	Dollars Asked (in millions)	Loans Approved	D L mi
Jan. ...	568	$139	218	
Feb. ...	789	85	259	
Mar. ...	906	145	370	
Apr. ...	817	130	337	
May ...	877	98	416	
June ..	913	97	427	
July ..	943	133	376	
Aug. ..	1265	131	470	
Total ..	7,078	958	2,873	

Alaskan, Okinawan Defens

ALASKA and Okinawa defens struction, passed by Congres signed by the President, auth $166.5 million for housing, s roads, electric power equipmen other improvements for maint defense forces.

Guided Missiles Research

PRESIDENT Truman signed t authorizing construction by th tional Bureau of Standards guided missile research buildin cost of $1.9 million. No wo the project can be undertaker an appropriation is granted.

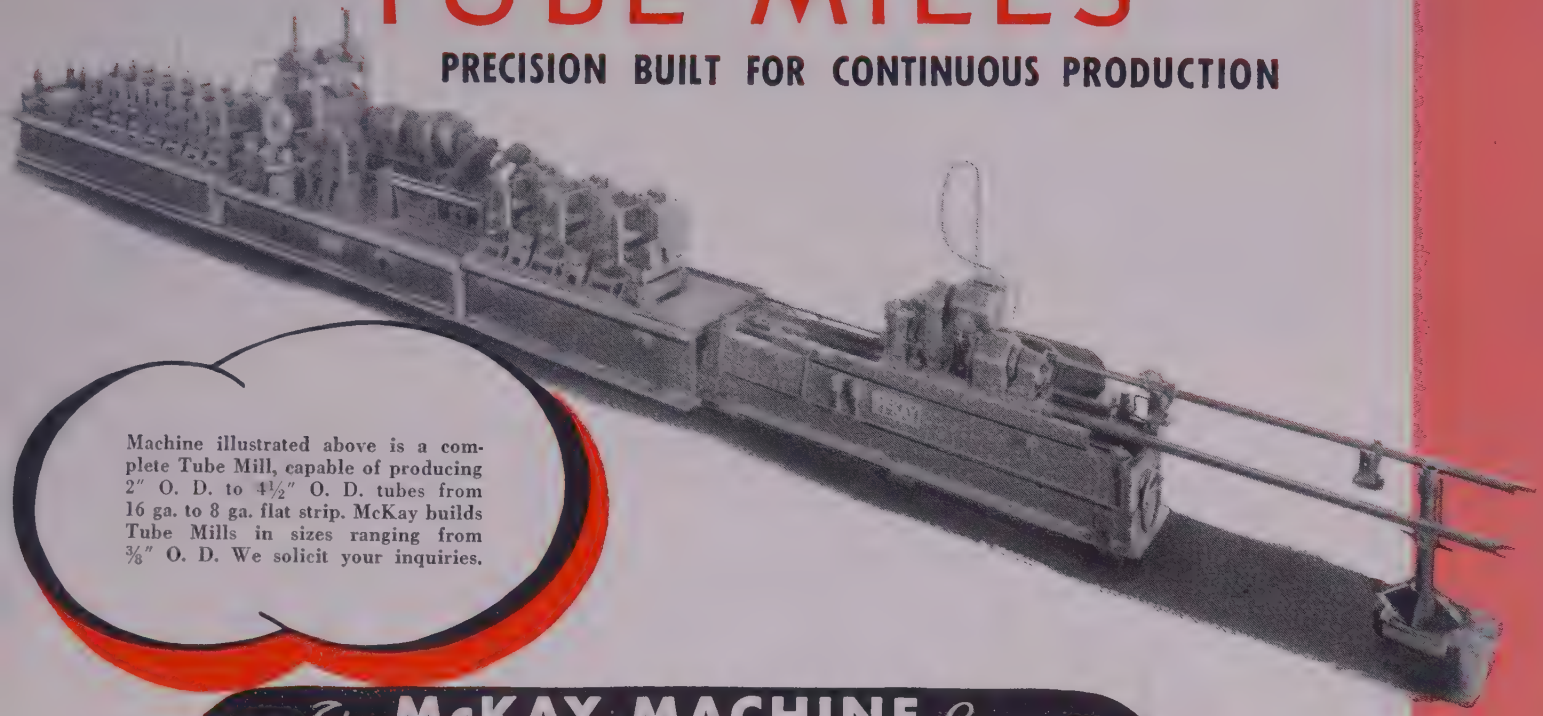
1400 More Miles of Railr

NEGOTIATIONS paving the w construction of 1400 miles of ra

McKAY

RESISTANCE WELD TUBE MILLS

PRECISION BUILT FOR CONTINUOUS PRODUCTION



Machine illustrated above is a complete Tube Mill, capable of producing 2" O. D. to 4½" O. D. tubes from 16 ga. to 8 ga. flat strip. McKay builds Tube Mills in sizes ranging from ⅜" O. D. We solicit your inquiries.

The McKAY MACHINE Company

ENGINEERS AND MANUFACTURERS OF SHEET, TIN, AND STRIP MILL EQUIPMENT

YOUNGSTOWN, OHIO

ASSOCIATED COMPANY

The WEAN ENGINEERING CO., Inc. • WARREN, OHIO

McKay Electric Resistance Weld Tube Mills can be put to work quickly and easily in your plant. Your present dependable personnel, after instruction, will become entirely competent to operate a McKay mill.

This has been accomplished by:

1. Simplifying and centralizing all necessary controls.
2. Complete protection through approved safety devices and interlocks.
3. Supplying motor drives and push button controls to essential heavy duty motions.
4. Eliminating necessity of welding from coil to coil — strip from coil threads itself through machine, without manual assistance.
5. Automatic Rotary Head Cut-off (patent pending) producing lathe cut and accurately maintaining desired lengths.
6. Providing simple, easy means of changing rolls for other tube sizes.
7. Typical rugged McKay construction insures high production with a minimum of maintenance.

to link the systems of Alaska and British Columbia will be opened shortly by the State Department with Canadian authorities. If Canada agrees, the President will order the making of a survey and the drafting of plans and cost estimates. Actual construction could be begun only after further legislation by Congress.

New Quartermaster Research Lab

A NEW LABORATORY to be erected by the Army Quartermaster Department will be used for all research and testing except on food items which will continue to be conducted at the existing laboratory near Chicago.

The new laboratory will have facilities for research work on such things as clothing, shelter and steel hand tools. In passing the measure Congress ended the fight between Philadelphia and Boston as the site of the new plant. Selection was left to a committee to be appointed by the Research and Development Board. Only thing certain is that it will be in the eastern part of the United States. Work cannot be started until the appropriation is granted; that will be requested next year.

Standard Bureau's New Editions

METALLURGY Division of the National Bureau of Standards is preparing to issue new editions of outmoded circulars now that it has caught up with a backlog of work left over from the war.

One, says Dr. John G. Thompson, division chief, will be a complete revision of the comprehensive circular, "Nickel and Its Alloys," which was revised last in 1924. Another will be a revision of the circular, "Heat Treatment and Properties of Iron and Steel," published in 1936. In an advanced stage is a new circular to be called "Solders and Soldering."

Work is being resumed on the pure iron project. In 1937 the division, by chemical purification, produced iron of 99.99 per cent purity, the only metallic impurity being a trace of copper. Work on metal powder is being pushed so metal powder specifications can be worked out. X-ray studies of metals are being continued; emphasis is on high and low-temperature properties, fatigue and mechanism of fatigue, and on formation and propagation of cracks in welded steel. The studies of underground corrosion continue to be pushed; emphasis is on cathodic protection. Other corrosion investigations involve metal in aircraft construction and light metals used in building exteriors. Now in the hands of the editorial committee is another report on what has happened to ferrous piping after prolonged underground use in the Washington water system.

New achievements by the Division of Metallurgy include development of a gage to permit continuous measurements of reduction of area of test pieces immersed in a cooling bath for the determination of low-temperature properties. This new gage is to be described in the bureau's Journal of Research for November.

Patent Laws Due For Overhaul

NEXT major overhaul of the patent laws is scheduled to start in January when the Senate Judiciary Subcommittee on Patents, Trademarks and Copyright Laws will launch exhaustive hearings on S. 2518.

Introduced by Sen. Alexander Wiley (Rep., Wis.) at the request of the Milwaukee Patent Law Association, its announced intention is to do away with uncertainties that have grown out of recent Supreme Court decisions. The measure has stirred up considerable controversy, and the inclusion of jokers has been charged.

Chief provisions are these: There shall be no criteria of patentable invention or discovery other than novelty. Determination by the commissioner of patents as to what constitutes novelty shall be final. In any patent action, the claim of the patent shall constitute and determine the scope of the invention covered thereby, and a claim based on functionality "shall cover the corresponding structure or acts described in the specification and equivalents thereof." The bill defines infringement, and identifies the arguments which cannot be used as defense in damage suits for infringement.

Manganese and Mica Barter

EXCHANGE of 1 million tons of American wheat for Indian manganese and mica, now being negotiated by the State Department, may be the first barter deal under a Commodity Credit Corp. charter amendment.

It permits CCC to improve its bad inventory situation by trading surplus agricultural commodities for strategic and critical materials. The wheat deal would make only a small dent; it would take about one-seventh of the stored wheat. The agency's inventory now comes to $1.1 billion and includes surpluses of 19 agricultural products.

Senate Plans Thorough Stud

SOCIAL SECURITY expansion which was passed by the H will not get perfunctory treatme the Senate. The Senate Finance mitte augmented its staff to co a thorough study of the 201- House bill. Also, interested pa will be asked to state their v before the committee in Jan hearings. The committee hopes t port a bill in time for Senate a next year.

You'll Hear About Pollutio

MANUFACTURERS whose p are located along rivers and othe land waters will learn about v pollution almost immediately.

Congress appropriated $1 m for federal aid to states, inter groups and other agencies to co surveys of pollution caused by dustrial wastes. The Public H Administration already allocated entire amount to be spent in 4 the 53 states and territories au ized by Congress to receive aid, and the same act appropr $200,000 to help defray the of planning antipollution pro

Consolidation Off to Good S

CONSOLIDATION of like unit the Bureau of Foreign and Dom Commerce is off to a good s

Three commodity branches of Office of International Trade, cr to handle special export prob during the war and in the manda controls period after the war, merged with three opposite num in the Office of Domestic Comm of which H. B. McCoy is dire The three ODC units are the Ma ery and Transportation Equip Division—William L. Beck, chief Iron and Steel Division—Fran McCue, acting chief; and the struction Division—John L. Ha chief.

Later there will be similar solidations of the units conc with chemicals, foods, forest p ucts, general products, nonfe metals, rubber, textiles, leather The resulting groups will be p permanently in the Office of D tic Commerce. This change r a return to the organizational up before the war and is also i cordance with recommendatio the Hoover commission for the l ing of duplicating and overla branches and divisions.

No changes are contemplat the bureau's Office of Business nomics or in the present re offices setup.

urope's Industry Must Do More Research

French, British scientists, industrialists meeting in Paris hit "tariffs on knowledge," tax policies and business timidity which curb development work

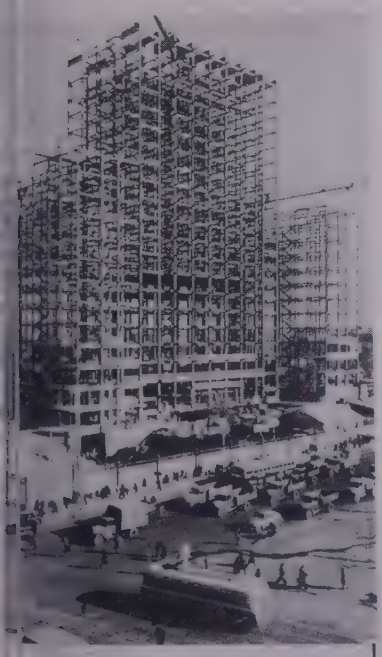
ROPEAN industry must spend e money, time and effort on re- rch and development.

his is the consensus of industrial- and scientists who attended a t meeting of the British Insti- e of Metals and the French Metal- gical Society in Paris. At the con- tion, speakers urged formation an international technical society elp in the exchange of scientific rmation.

Members of the metals groups icized the "high tariffs on know- ge" fostered by rampant national- , tax policies of European nations ch discourage research and the idity of many businessmen who se to gamble on product develop- its.

conomic Commission for Europe nds these opinions. In a report housing, it gloomily predicts that rope will take another 22 years get adequate dwellings if the pre- rate of construction is main- ed as it has been. International hange of scientific information collaboration in research work ind better building methods and improved materials are the only answers to the problem. Europe, all told, lost 8 per cent of its building wealth because of the war. At the end of 1947 only 1.6 per cent of the war damage had been repaired.

There are a few bright spots in the dark research picture, speakers at the Paris convention and ECE spokesmen believe. The French iron and steel industry is co-operatively supporting a research organization which has already begun operations. The British construction industry is making strides, particularly in design of aluminum buildings. The Norwegian farm equipment makers are active in product development, will soon introduce a revolutionary type of planter. Even in Western Germany, the gadgeteer—now flooding the market with dozens of household knickknacks—heralds the return of the inventor of more important types of products.



SOVIET SKYSCRAPER: This is the metal frame of the 26-story office building under construction in Moscow's Smolensky Square. It is part of postwar reconstruction. NEA photo

French Labs in Operation

Paris convention delegates visited the major laboratories of France. These include the locomotive testing plant of the French National Railroads at Vitry, another laboratory at Vitry for government-sponsored fundamental research, a facility at Bellevue for product development and a plant for iron and steel research at Saint-Germain near Paris.

This last laboratory was founded in December, 1944, and is financed by the steel industry by means of levies on pig iron and ingot steel. An institute which runs the plant applies scientific research to industrial technical problems and helps individual steel producers with problems beyond their scope. The institute is now mainly concerned with the enrichment of iron ores, heterogeneity of forging ingots and protective coatings for steel products.

Individual companies can still safeguard their own inventions. For Example, Societe d'Electro - Chimie, d'Electro-Metallurgie et des Acieries Electrique d'Ugine controls patents on an extrusion process for steel, blueprints for which have been brought to the U. S. by Graham W. Parker, New York management consultant for Ugine.

The process, invented and patented by Rene Perrin, metallurgist and executive of Ugine, makes it possible to handle steel like a plastic material. The process permits extruding the most intricate forms and sections in a hydraulic press. This eliminates many costly operations of forging and machining. Finished gears of alloy steel can be made in two operations by the Ugine method. Ugine has head offices in Paris, employs 24,000 workers in its alloy steel plants and operates three research laboratories.

U. K. Designs New Building

One of the most spectacular new products with which Britain hopes to lure American sales is an aluminum building featuring roof suspension by steel cables rather than by conventional truss members. The structure is suitable for canteens, exhibitions and shows. It is portable and available in sizes providing from 2646 to 34,200 sq ft of floor space.

The patent office in the United Kingdom is doing a moderate business. New patents having application for jet and conventional engines are the most numerous.

The British now are stressing production methods more than new products as a means to regain their economic feet. Indicative of this is the number of productivity teams which have visited the U. S. The ninth is now in this country studying American methods of generating, transmitting and distributing electric power.

Norway Develops Farm Unit

Norway will begin marketing a new planting machine early in 1950. It can be used for practically any kind of vegetable and feed plants. Distance between plants and rows can be regulated according to needs. The device can undersell any imported product in Norway and is competitive in price with similar American machines on the export market.

Development of farm machinery is only one phase of Norway's reconstruction. Most ambitious is the rehabilitation of Norway's largest iron ore mine at Sorvaranger which was totally destroyed by the Germans. In 1939, the peak year of production, the mine produced 839,000 tons. It is now being rebuilt, will be ready for full output by 1952 and is expected to yield 1 million tons yearly.

Norway's road traffic rose from 5 million vehicle-kilometers in 1920 to 95 million in 1947. The country has 27,500 miles of roads. Railroads have a 2750-mile system, of which about 16 per cent is now electrified. The Norwegian Airlines System has increased its traffic from 1 million passenger-kms in 1935 to 85 million in 1948.

Estimates indicate that the potential power capacity of Norwegian

waterfalls is more than 100 billion kwhr annually. The developed capacity reached 13.5 billion kwhr in 1946, will reach 16 billion this year. The per capita consumption of electric power in Norway is the highest in the world; 41 per cent of the energy is consumed by electrochemical and electrometallurgical industries; 22 per cent by other industries; 1.5 per cent by the railways; 35 per cent by general users.

German Gadgets Return

The immense popularity in Western Germany of household gadgets —new ones ranging from beer warmers to mechanical hat racks are flooding the market now—indicates that the German inventive flair is coming back, that developments in more important products will be forthcoming.

The nation needs inventive genius for its economy is precarious. Only the automobile industry is still booming. Total production of all cars reached 16,525 units in September, compared with 15,628 in August. Many new plants will soon begin production.

Volkswagen, which is the largest producer, is still publicly contro
The issue of public ownership i
industry is bobbing up again.
strongest party, the Christian D
crats, is none too powerful at
may have to make concession
moderate socialists who are cla
ing for modified nationalization,
ticularly in the coal industry.

Dismantling of the Thyssen
works is proceeding rapidly. Abo
per cent of the plant has been
down, including several open-he
furnaces, rolling mills and auxi
equipment, a conversion mill,
pig iron furnaces and a power p

Coal, Steel Strikes, 40-Hour Week Dim Railroad Buying Prospe

By HOWARD C. TUTTLE
Chicago News & Market Editor

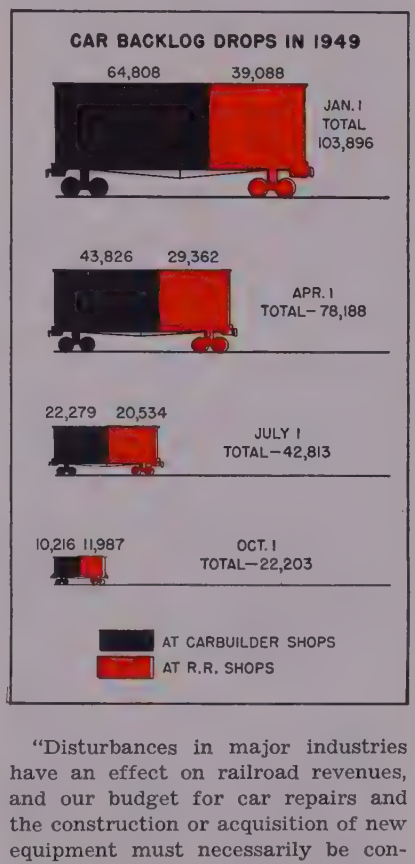
WHAT are railroads planning to do next year? What equipment and materials will they buy? Where will they get them? These are a few of the questions running through the minds of people who supply this great industry.

The questions are more pertinent today than for years past. To at least one important group of metal-working companies—the car and locomotive builders—the answers mean bread and butter. The same applies to the foundries, forge shops and others that live off the business done by car builders.

Many Uncertainties—Railroads normally would know by this time the answers to most of these questions. Their next year's requirements would be pretty well determined; they'd have a good idea of the tonnage and passengers they would be called on to transport; they could closely figure what their expenses would be, how much money they would take in. Right now they don't know these things, and they don't feel they can be very good guessers.

Their problems are many. To name a few: The 40-hour week, inroads on traffic by other modes of transportation, labor's demands, sharp loss of revenue from two of their most important freight commodities —steel and coal. These problems stand like a stalled freight train blocking the view up the right-of-way.

Strikes Hit Traffic—Adoption of the 40-hour work-week is of less immediate concern than the situation arising out of the strikes. George M. Crowson, assistant to the president, Illinois Central, says: "The labor situation in the coal and steel industries has a much greater impact on the revenues of the Illinois Central than the 40-hour week has.



"Disturbances in major industries have an effect on railroad revenues, and our budget for car repairs and the construction or acquisition of new equipment must necessarily be considered in the light of our earnings."

Railroaders Agree—Other railroaders think much the same. C
Buford, president, Chicago, Milw
kee, St. Paul & Pacific, says:
tional economic conditions will
greater effect on our acquisitio
new cars and locomotives than
adoption of the 40-hour work-we
Douglas C. Turnbull Jr., execu
assistant, Baltimore & Ohio, sta
"Any overall planning that we
done has been knocked in a co
hat by steel and coal. . . The
hour week is important but c
tions in the weeks that we have
it are far from normal." E. C. Ge
heimer, acting director of public
lations, Pennsylvania Railroad,
that because of the uncertain
ditions now existing it is impos
to provide any information as to
road's future purchases.

Lack Experience on Short We
The Union Pacific, through A
Seitz, executive vice president,
ports: "We have not had suffi
experience with the 40-hour w
week to determine its effect on
future requirements." A. T. Mer
president, Southern Pacific,
"The 40-hour week has not bee
effect long enough for us to d
mine to any definite degree
changes the compressed work-
may bring in connection with
railroad equipment buying wher
are again in the market."

The views of J. H. Day, vice p
dent—traffic, New York, Chica
St. Louis, who says that "the 40-
week will have a tendency to
ther decrease railroad purchases
til such time as traffic via rails,
ticularly freight traffic, reverses
present downward trend," are
entirely shared by Walter J. T
president, Chesapeake & Ohio,
liam White, president, Dela
Lackawanna & Western, or E
Doherty, New York Central.

Sees Little Change—Mr. T
says: "No substantial change

FREIGHT CAR DELIVERIES

	Car Builders	Railroad Shops	Total Deliveries
Jan.	6,130	2,783	8,913
Feb.	7,421	2,894	10,315
Mar.	8,958	2,924	11,882
Apr.	8,499	2,088	10,587
May	6,879	2,646	9,525
June	5,805	3,316	9,121
July	3,655	2,779	6,434
Aug.	4,245	2,933	7,178
Sep.	3,936	2,205	6,141

FREIGHT CAR AWARDS

	Car Builders	Railroad Shops	Total Awards
Jan.	1,393	175	1,568
Feb.	332	...	332
Mar.	269	200	469
Apr.	30	...	30
May	589	...	589
June	153	...	153
July	208	200	408
Aug.	185	...	185
Sep.	123	...	123

ng habits are expected to result
adoption of the 40-hour week.
car repair shops may be used
limited extent to build new
ht cars in order to stabilize em-
ment on a 40-hour per week
s. We do not expect to send
ht cars to outside shops for re-
s." Mr. White says: "The adop-
of the 40-hour week will have
ing to do with our buying hab-
We simply have to do as much
in 40 hours as we heretofore
in 48." At the New York Cen-
"the change to the 40-hour week
t expected to make any change
uying habits or types of equip-
t, which will continue to be made
rding to requirements of traffic."

uying Plans Undecided—In light
heir uncertainty over the com-
d effect of the various factors
; not surprising most of these
s either do not now know what
will do over the remainder of
year and in 1950 with respect
ew car building or do not expect
uy any additional equipment.
r. Buford of the Milwaukee road
: "After completion of our new
construction program late this
I don't believe we will be in the
ket for any new freight cars in
unless there is a substantial in-
se in the volume of traffic."

& O Buying Light—The C & O
s no substantial purchases of
freight cars in 1949-50. Some
passenger cars and 135 diesel-
ric switching engines are on or-
for delivery in this and next year.
development of "modern light-
ht, radically different" passen-
carrying equipment "we are pro-
sing actively," Mr. Tuohy reports.

ans No New Purchases—The
tawanna "so far as we know
," Mr. White says, "will not pur-
e any new cars during the re-
nder of this year or in 1950." But
e is a possibility that some cars
special nature may be ordered.
els now handle practically all the
's main line business and with a
e number of serviceable steam
motives stored "it is unlikely any
tional locomotives will be ordered
re the end of 1950, although it
ossible that we might purchase
nany as ten 1000-hp diesel yard
nes."

he Nickel Plate, states Mr. Day,
no plans for purchase of freight
or locomotives between now and
end of 1950. The road expects to
delivery of 200 new 50-foot box
beginning this month.

he Union Pacific's 1950 plans are
yet crystallized but it does not
emplate placing orders for addi-
al rolling stock during the re-
mainder of this year, according to Mr. Seitz.

Modernization Completed—Most of the IC's postwar car repair, building and modernization program has been completed. The passenger train portion of the overall program was finished some time ago. Its ambitious freight car program consisted of the building of 4155 freight cars from 1946 to 1948 and 4975 cars in 1949. By Sept. 30 all these except for 266 50-ton hoppers, being built by a contract shop, 421 50-ton hoppers, abuilding in its own shops, and 375 50-ton flat cars, also from its own shops, had been delivered. These remaining cars, except for 266 flat cars, will be delivered this year. Two 2000-hp diesel transfer locomotives are scheduled for late 1949 delivery and 20 1000-hp diesel switch engines will come through in 1950. The road's 1950 repair and building program is not definitely set at this time, Mr. Crowson adds.

While, according to Mr. Mercier, the Southern Pacific's program for new rolling stock acquisition in 1950 is not completely formulated, on Oct. 1 the following equipment, all scheduled for delivery by July of next year, was on order: 77 diesel locomotives, including 33 6000-hp freight engines, estimated cost $26.8 million; 4047 freight cars, $20.5 million; 139 passenger train cars, $19.3 million.

New Buying Slackens—The pace of new buying has slackened but has not completely stopped in its tracks. Maybe one man hits the spike on the head when he says: "Our problem continues to be a vigorous search for the hiding place of the bottle of black ink." A few inquiries for new equipment have gone out in recent weeks, possibly to get the feel of the cost picture in the coming year. There is a strong belief among some railroad men that they can meet and beat the independents' competition.

Backlogs Dwindle—Statistics compiled by the American Railway Car Institute (see chart table) show several significant developments. Notable is the drastic reduction in number of freight cars on order as of Oct. 1 compared with Jan. 1. Latest figures show the railroads themselves now hold more orders than car builders. Although deliveries of new freight cars from railroad shops show little change from month to month this year, deliveries from the independents were substantially lower in recent months. Bulk of new awards continue to be made to unaffiliated car shops. This is especially true in the case of passenger cars.

CALENDAR OF MEETINGS

Nov. 7-8, Conference on X-ray and Electron Diffraction: Mellon Institute of Industrial Research, Pittsburgh.

Nov. 10, Illinois Manufacturers' Association and Armour Research Foundation: Second annual conference on industrial research, at Technology Center, 35 W. 33rd St., Chicago. Association headquarters are at 120 S. LaSalle St., Chicago.

Nov. 10, American Iron & Steel Institute: Sixth regional technical meeting, at the Mark Hopkins Hotel, San Francisco.

Nov. 10, Purchasing Agents Association of Chicago: Meeting, Hotel Sherman, Chicago. Association headquarters are at 134 N. LaSalle St., Chicago.

Nov. 10-11, American Management Association: Meeting on industrial cost reduction, at Palmer House, Chicago. Association headquarters are at 330 W. 42nd St., New York.

Nov. 10-11, National Foundry Association: 51st annual meeting, Waldorf-Astoria Hotel, New York. Association headquarters are at 120 S. LaSalle St., Chicago.

Nov. 10-11, National Symposium on Air Pollution: Sponsored by Stanford Research Institute in co-operation with California Institute of Technology, University of California and University of Southern Calif., Huntington Hotel, Pasadena, Calif.

Nov. 14-18, Refrigeration Equipment Manufacturers Association: Sixth refrigeration and air conditioning exposition, at Atlantic City Auditorium, Atlantic City, N. J. Association headquarters are at 1346 Connecticut Ave. N. W., Washington.

Nov. 15, American Supply & Machinery Manufacturers' Association and **National Supply & Machinery Distributor's Association:** Cosponsors of the second industrial distribution forum, Congress Hotel, Chicago. American's headquarters are at 1108 Clark Bldg., Pittsburgh.

Nov. 16-18, Industrial Hygiene Foundation: 14th annual meeting, Mellon Institute, Pittsburgh.

Nov. 17-18, Magnesium Association: Quarterly meeting, New York. Association headquarters are at 30 Rockefeller Plaza, New York.

Nov. 25-26, American Foundrymen's Society: New York regional conference, Syracuse University, Syracuse, N. Y. Society headquarters are at 222 W. Adams St., Chicago.

Nov. 26, American Iron & Steel Institute: Regional technical meeting, Thomas Jefferson Hotel, Birmingham.

Dec. 26-31, American Association for the Advancement of Science: Meeting, New York. Association headquarters are at 1515 Massachusetts Ave., Washington.

Nov. 28—Dec. 3: 22nd Exposition of Chemical Industries: Grand Central Palace, New York.

Nov. 28-Dec. 2, American Society of Mechanical Engineers: 70th annual meeting, Statler Hotel, New York. Society headquarters are at 29 W. 39th St., New York.

Nov. 30-Dec. 2, Society for Experimental Stress Analysis: Annual meeting, Hotel New Yorker, New York. Society postal address is Box 168, Cambridge 39, Mass.

Dec. 1-2, Council of Profit Sharing Industries: Second annual conference, Hotel Roosevelt, New York. Council headquarters are in the First National Tower, Akron.

Dec. 2, American Council of Commercial Laboratories: Meeting, Hotel Statler, Washington. Council headquarters are at 318 Evans Bldg., Washington.

Dec. 6, Material Handling Institute: Annual meeting, Hotel Commodore, New York. Institute headquarters are in the Clark Bldg., Pittsburgh.

Dec. 8-10, American Institute of Mining & Metallurgical Engineers: Seventh annual conference of Electric Furnace Steel Committee. Institute headquarters are at 29 W. 39th St., New York.

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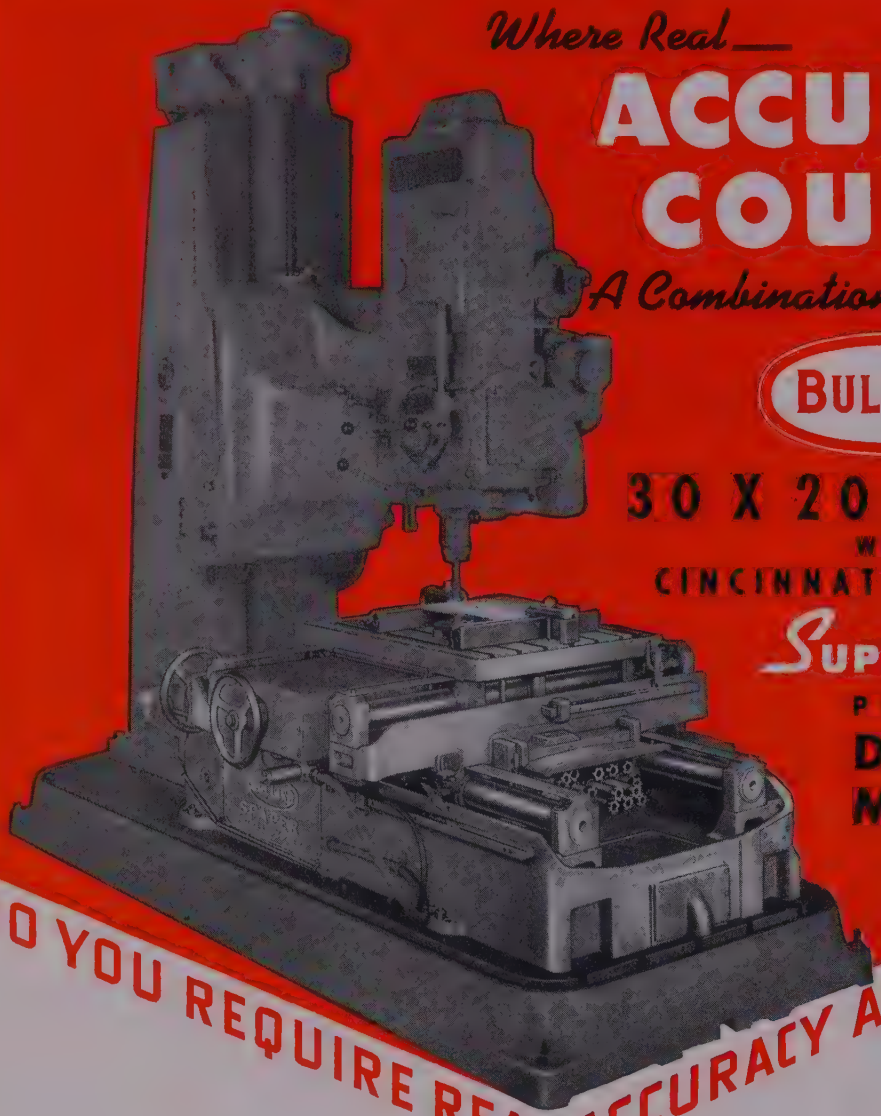

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A. H. ALLEN *Detroit Editor, STEEL*

Mirrors of Motordom

Automakers, faced with steadily increasing employment costs, renew efforts to trim production, maintenance, packaging, distribution and purchasing costs

DETROIT

'H the labor ante being boosted pensions and insurance, renewed rts are being made to trim manuuring costs. Progress in this dion over the past four years has remarkable and has been one or in holding motor vehicle price s to 93 per cent since 1939, while age weekly wages climbed 130 cent.

hile steady improvements in proion machinery have resulted in ortant economies, there has been urrent attention to nonproduc- operations—materials handling, matic inspection, better plant ntenance and repair practices improvements in packaging, puring methods and parts distribu-. In one automobile company e are presently 96 technical comees studying ideas for cost reions. Any plan that looks promig is tested in one of the comy's plants, and if the results are d it is spread immediately to all r plants where applicable.

eaks Eliminated—Many suggesis are relatively simple. In one lt, for example, a program for icing leaks in compressed air lines tested. It involved repacking ir valves and taking out unneeded s. When the program showed ngs it was put in force at all ts using compressed air and the ngs last year alone totaled nd $100,000.

nother plant was using permaet containers to ship small parts various assembly points. A new tainer was devised, with a wood and cardboard sides, to hold up 2 tons of parts. It was sold as p after one use, ending repair k on containers and return-ship-t costs. In the last year this container was widely used and brought savings of well over $1 ion.

ncreases Tool Life—Still another manufacturer set up a tool reh department after the war. By ing various types of drills, dies other basic tools, the department found ways to increase tool life as much as 800 per cent on some . On one type of tool alone, the company saved $191,000 last year.

One automotive company was able to transfer 1000 men to more productive jobs by installing automatic equipment on 60 major production lines and several hundred smaller lines. The equipment includes "iron hands" to place stock into presses and remove it after forming, automatic oiling and scrap removal systems, and devices to remove metal burrs and to count, stack and load various finished parts. This company has made 54 changes in machine equipment or attachments in the past year and has realized savings ranging from $2000 to $200,000.

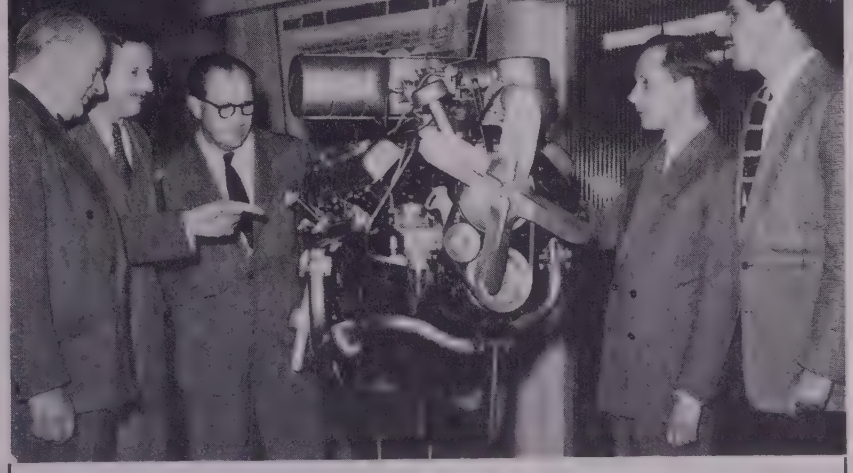
Save $71,000 on Gloves—A switch from rubber work gloves which cost $1.14 a pair and lasted only one day, to plastic gloves at 88 cents a pair and lasting three days meant a saving of $71,703 at another plant.

Simplification of parts design also has resulted in appreciable cost savings. One firm which produces over a million vehicles annually saved $1 per vehicle in the last year by using a less complicated ignition switch, and saved 19 cents per vehicle by changing from a two-tone to a single color in steering wheels.

Wage Bill Triples in Decade—Today there are about 800,000 persons working for U. S. automotive companies, or 71 per cent more than in 1939. And with average wages now nearly $70 a week, comparing with $32.91 ten years ago, the industry's total wage bill is more than triple what it was in 1939. Part of the increased employment is due to today's higher production volume, but the average motor vehicle, because of postwar styling and new engineering features, requires substantially more man-hours of labor in its building than did its 1939 counterpart. So, it has been the mobilization of technical and managerial skill to find ways to do the job at lower cost which has made it possible to employ more persons at higher wages, build vehicles with more "labor content" and still keep prices at a level attracting more buyers than ever before.

K-F Tools for Light Car

KAISER-FRAZER has held the first of a series of country-wide dealer meetings at which details of the company's future planning are being re-



FOR HAPPIER MOTORING: Inspecting a General Motors high compression test engine used for research into better motor fuels are George H. Kublin, manager of the Detroit staff of GM Overseas Operations; Col. Charles W. Kerwood, ECA technician; Paul Chatelin, technical administrator, Technical Center of the French Foundry Industry, Paris; R. Donn, chief of the industrial analysis branch, French Embassy in Washington; and A. J. de Seabra, chief interpreter, U.S. State Department

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vealed. Detroit dealers were shown pictures of the new low-priced car which the company is tooling to place in production next spring. It will be followed later in the year by two completely redesigned models in the medium-price class. About $22 million of the $34 million loan negotiated by K-F with the RFC will be required for dies, jigs, fixtures and other tooling for the three new series of passenger cars. At the moment, the K-F plant is shut down, apparently for the purpose of clearing out stocks of completed cars. This doubtless is one condition of the RFC loan—that inventories of assembled cars be cleaned up. To do this it was necessary to arrange another $10 million loan to cover wholesale financing operations. Conditions of the latter stipulate it may be used only for wholesale financing of current factory stocks, said to be several thousand.

Plan Name Contest—An intensive campaign of promotion for the new lower-priced model is being shaped up for early release. Among other things it will feature a $200,000 prize contest for best suggestions for a name for the car. Entry blanks will be furnished by K-F dealers, and if the contestant has his old car appraised for trade-in value at the same time he picks up a contest blank, he can win a double prize.

When production is resumed at Willow Run, present models will be continued unchanged, with a switch to 1950 serial numbers being made to differentiate them from 1949 models. The forthcoming small car will be priced below anything now on the market in the low-priced field. It will feature safety and economy of operation, will not be sub-standard dimensionally.

Price More Important—There is little question that price is coming to be a more important factor in the minds of buyers. Sales in the low-priced field are higher this year than last, proportionately, and all producers report their lower-priced models are meeting with increasing favor. The proportion of sixes to eights is climbing, Ford for example now building 22 per cent sixes as against 15 per cent a year ago.

Crisper Designs Coming

SEVERAL hundred were in attendance at the annual meeting of the American Society of Body Engineers here last week. Seventeen technical papers were presented at afternoon and evening sessions, covering such subjects as styling, small cars, use of die castings, control charts in assembly operations, welding methods, self-retaining fasteners, and automobile bodies in Europe.

In an appraisal of passenger car designs, Carl W. Sundberg of Sundberg & Ferar predicted that a trend will develop toward designs that are more crisp and well-defined. He said this has been true in such products as household appliances and business machinery, the buying public welcoming the crisper, slightly more severe shapes as a relief from the so-called streamlined shapes which have been so much in vogue for the last ten years. He added that yearly style changes are one of the greatest evils and pitfalls for the modern designer since they often lead to a "corned-up, overdone type of product in order to make it look different from the preceding year's style."

Automobile Production

Passenger Cars and Trucks—U. S. and Canada

	1949	1948
January	445,092	422,236
February	443,734	399,471
March	543,711	519,154
April	569,728	462,323
May	508,101	359,996
June	623,689	454,401
Six mos.	3,134,055	2,617,581
July	604,351	489,736
August	678,092	478,186
September	657,078	437,181
October	605,000*	516,814
November		495,488
December		514,337
12 mos.		5,549,323

* Preliminary.

Estimate for week ended:

	1949	(Same week) 1948
Oct. 15	146,566	123,185
Oct. 22	143,049	123,067
Oct. 29	140,244	116,968
Nov. 5	130,000	118,229

Estimates by Ward's Automotive Reports

Ford Surplus Grows

FORD has filed its annual report with the Massachusetts state tax commissioner, disclosing an increase in surplus of better than $77 million for 1948. Total assets as of last December stood at $1,149,240,000, with real estate, machinery, equipment, tools and fixtures totaling $430,570,000.

Two new plant projects are being shaped up for early operation by Ford. One is a large die casting operation which will be centered at Monroe, Mich., in a plant recently purchased from Kelsey-Hayes Wheel Co., the other is an automatic transmission project which will be located at Cincinnati. The latter is scheduled for production by spring and company is understood to have quired a plant in the Cincinnati ar full details not having been relea as yet. Ford will build half its tomatic transmissions, Borg-War at Muncie, Ind., the balance. A la list of machinery and tooling for project is now up for quotations equipment builders, deliveries be specified for next March.

Another Good Quarter

GENERAL MOTORS sales, net come, production and payrolls c tinued at record high levels dur the third quarter, sales totaling o $1.5 billion to bring volume for first nine months to $4,458,079,5 Net income for the quarter was equ alent to $4.45 per share on comm stock, bringing earnings for n months to $11.21 per share. Us all the new and improved facilit placed in operation since the w GM plants were operated at capac levels from April through Septe ber. Employment for the third qu ter averaged 405,786, a new pea time high. Payrolls were $376 milli

Nash Schedules Suspension

NASH has announced it will be for to suspend car assembly at its t main plants in Wisconsin by ab Nov. 18 as a result of the coal a steel strikes, although resumption steel output could make it possi to revise this planning. However, is doubtful if shipments could be sufficient volume to avoid some slo ing of assemblies. The Nash pla at El Segundo, Calif., has suffici inventory to continue operations u the first week of December. Ab 12,000 will be idled in Wisconsin.

Packard Sales Up

PACKARD has reported consolidat net income of $9,111,568 for the fi nine months of the year, equival to 61 cents per share on comm stock. In the same period a ye ago, income was equivalent to cents a share. Net sales for ni months this year, however, were from a year ago, aggregating $18 197,673. Car shipments totaled 8 653. Early last month, the compa trimmed its assembly schedules fr 92 to 45 cars per hour with the id of projecting existing materials a supplies over the longest period time. It is expected the current le of assemblies can be continu through this month.

On its Way WITH NO DELAY

At **COPPERWELD**, the shipping department plays a very important part in customer satisfaction. Whether it is a carload of billets or a one pound sample, there is no "bottleneck" in the shipping department. And just as important as "speed" is "checking". Not one single pound of Aristoloy Steel is shipped until our metallurgical department has authorized its release. This release is assurance that it meets all the chemical and physical requirements of the customers' specifications.

You'll buy no finer steel anywhere, and you'll get it faster from Copperweld.

ARISTOLOY STEELS *Hit the Mark . . .*

ARISTOLOY STEELS

Upper photo shows each bar being measured and recorded. This information is sent along with shipment. Lower Loading billets in gondola car. Special blocking keeps steel in place enroute and makes for easy unloading.

QUALITY CARBON
STANDARD STRUCTURAL ALLOY
BEARING QUALITY
ALLOY TOOL
STAINLESS
SPECIALTY
NITRALLOY
CARBON TOOL
MAGNAFLUX - AIRCRAFT QUALITY

COPPERWELD STEEL COMPANY WARREN, OHIO

8 Union Commerce Building, Cleveland, Ohio
403 W. Eighth Street, Los Angeles 14, California
Monadnock Building, San Francisco 5, California
7251 General Motors Building, Detroit, Michigan
O. Box 1633, a, Oklahoma
117 Liberty Street, New York, New York
176 W. Adams Street, Chicago, Illinois
529 Fisher Building, Detroit, Michigan
3104 Smith Tower, Seattle, Washington

Acquisition Planned

Standard Spring Steel will buy Falls Spring & Wire if stockholders approve

DIRECTORS of Standard Steel Spring Co. Coraopolis, Pa., and Falls Spring & Wire Co., Detroit, plan to have Standard acquire all assets of the Detroit company.

Willard F. Rockwell, chairman of Standard, says the plan will be submitted to stockholders of both companies for approval. If Standard takes over Falls, Harry Fante, chairman, Harry Swanson, president, and John P. O'Hara, director, of Falls Spring & Wire would be added to the board of Standard Steel Spring. The Falls plants would continue to be operated by the present management. Mr. Rockwell did not reveal any other details of the acquisition plan.

Falls Spring & Wire was incorporated by the late William A. Falls and his associates in 1935. It has two plants in Detroit, one in Chelsea, Mich., one in Chicago and one in Kansas City, Mo. The company supplies part of the requirements of cushion seat springs and back springs to auto manufacturers. It is one of the biggest producers of cushion springs, mechanical springs and tubular products for the automotive industry.

Total area of the Falls plants is about 900,000 sq ft. Company employs about 3500. Its sales for the first ten months of the year are reported to have been approximately $21.5 million.

Rheem Plant Gets New Owner

A ST. LOUIS iron and pipe dealer purchased the Birmingham plant of Rheem Mfg. Co. at public auction for $150,000. Buyer is Louis Greenspon.

The Rheem properties include two large one-story buildings on 14 acres of land, plus several smaller buildings. The company, which manufactured shell casings during the war, later went into production of tanks, attic fans, and space heaters, but several months ago abandoned its Birmingham operations.

New Bethlehem Pacific Plant

BETHLEHEM Pacific Coast Steel Corp. soon will start construction of its new structural steel fabricating plant in Seattle. Completion is planned by May 1, 1950.

The project will include a new structural shop equipped with forming, punching and shearing facilities to handle a wide range of steel frame structures. The shop layout will be designed for straight-line flow of fabrication from receiving to shipping end.

New plant facilities also will include a transmission tower fabricating shop and a complete galvanizing plant.

GE Doubles Plant Capacity

GENERAL ELECTRIC Co. completed a $2 million expansion of its transformer manufacturing plant in Oakland, Calif., making it the largest operation of its kind in the West.

Production capacity has been doubled by the expansion. The plant now produces transformers 1.5 kva to 1000 kva. Most raw materials used in the manufacture are purchased in the western states. The Oakland plant employs about 400 persons and will employ an additional 100 at capacity operations.

Anode Business Expanded

FEDERATED Metals Division of American Smelting & Refining Co., New York, acquired production facilities of Metallurgical Products Co., Philadelphia.

Federated will expand its business in electrical anodes through the addition and will merchandise anodes of all types through 24 sales offices

MAJOR PROJECT: Eight wrought iron conduits assembled into a unit of 8-in. centers were placed by derrick barge on sand bags 5 ft under the creek bed in a 2 ft clearance between old bridge piers and new cofferdams for the new Unionport bridge in the salty water of Westchester creek, New York. Conduits were fabricated by A. M. Byers Co., Pittsburgh

acros the country. E. L. Newhou Jr., American's vice president, is charge of the Federated division.

Production will be concentrated the division's Perth Amboy, N. plant under R. D. Taylor. The specialized equipment provides the efficient manufacture of vari types of anodes. Federated's te nical staff will be helped by I. Wilenchik of Metallurgical Produc The alloys and special products bu ness of that company will be c ducted by Mr. Wilenchik from company's Philadelphia plant, as the past.

United Buys Lobdell

LOBDELL United Co., Wilmingt Del., this month takes over the m ufacture of paper mill machine calendar stocks, paper and steel r roller grinders and Nazel forg hammers.

Assets of Lobdell Co.—plant, la buildings and equipment compris the machine shop of Lobdell—are ing acquired by United Engineer & Foundry Co., Pittsburgh, of wh Lobdell United is a wholly ow subsidiary.

K. C. Gardner, president of Unit is to be chairman of the board of new company. G. G. Beard, v president of United, becomes pr dent of Lobdell United.

It is the eighth company ow outright by United Engineering Foundry.

Cone-Drive Buys Parsons Pla

MICHIGAN Tool Co.'s Cone-Dr Gears Division bought the Trave City, Mich., plant of Parsons Co The 40,000-sq ft building was b during the war.

Cone-Drive Gears officials say terations to the plant will be shortly in the hope that operati can begin early next year. Ab 100 will be employed in the pla Cone-Drive makes a special type gear called "Cone-Drive" and duces speed reducers using that t of gear. In wartime the gears w used in battleships, tanks and planes.

Gulf Completes Expansion

TWO Ohio refineries of Gulf Refir Co.—at Toledo and Cincinnati— in full operation now that an month, $35 million expansion gram is finished.

Sixteen new refining structu buildings and plant extensions v erected at each refinery. Additi tankage increases storage capa to 50 million gallons.

Briefs . . .

Paragraphs on developments of interest and significance within the metalworking industry

n Conklin & Co. Inc., Baltimore, t metal distributor and fabrica- of down spouts and gutters, roll ing and stove and furnace pipe, aking over and equipping about 00 sq ft of space formerly oc- ed by McNamara & Co. Inc., steel e constructor, which is moving in- building of its own.

—o—

rnational Steel Co., Evansville, which formed a railway division ier this year, completed fabrica- and installation of 2000 stainless l refrigerator car interiors for iour & Co., Chicago.

—o—

erts-Gordon Appliance Corp., Buf- , purchased the idle Buffalo Fire liance Corp. plant and will expand production in the new location. chase price was about $150,000.

—o—

Aviation Inc., Binghamton, N. Y., ived two orders from the Navy operational flight trainers. Com- will hire about 100 more workers andle the contracts.

—o—

iam S. Clark, Baltimore, changed name of his machine shop from own name to that of Clark Ma- e & Welding Co.

—o—

pp Forge Co., Chicago, purchased entire capital stock of A. C. ds & Co., Rockford, Ill., fabrica- of steel. Roy A. Kropp, presi- , said the deal was for about ,000.

—o—

Product Coke Co. of Canada Ltd., sidiary of Koppers Co. Inc., Pitts- gh, is planning construction and ation of an industrial protective ings plant of 25,000-ton annual acity at Port Arthur, Ont. Coal base coatings produced at the t—to be in operation in about e months—will be applied to pipe transporting oil and natural gas the Alberta oil fields.

—o—

geport Brass Co.'s new Rumidor ision was set up as a new con- er division. It will be headed by ph C. Bender, a chemical engineer invented a process which solidi- the rum used in the Rumidor idor. General offices are in geport, Conn.

—o—

& Towne Mfg. Co., New York, blished a regional branch in Chi- to help bring its Philadelphia

DALLAS "ROCKET": What looked to be a rocket to motorists on the outskirts of Dallas turned out to be one of the legs for a huge water tower to be used in a housing development. NEA photo

factory a thousand miles closer to midwest users of mechanized handling equipment. The branch will handle sales, repair, maintenance and spare parts service for hoists, scales and industrial trucks. Company inaugurated regional demonstrations of attachments to permit standard materials handling machinery to be adapted to swift handling of materials in bags, boxes, barrels or bulk.

—o—

Atlas Trading Co., Chicago, steel distributor, opened a branch in Florida. Headquarters are at Ft. Lauderdale. Perc H. Weiner is in charge.

—o—

American scientists lead the world in applications of technical knowledge. So thinks Dr. Robert H. Krieble of the General Electric Research Laboratory. He made the statement after returning from Europe where he inspected various technical and scientific activities with his colleagues, Victor H. Fraenckel and Lyall Zickrick.

—o—

Porcelain Enamel Institute, Washington, reports nine manufacturers of finished metal products have adopted the official Safe Transit label signifying their packaged goods passed the preshipment test standards prescribed by the PEI-sponsored National Safe Transit Committee. Companies authorized to use the Safe Transit label are: A. J. Lindemann & Hoverson Co., American Stove Co., General Electric Co. (Erie), Geo. D. Roper Corp., Malleable Iron Range Co., Norge Division of Borg-Warner Corp., Refrigeration Division of Philco Corp., Tappan Stove Co. and Westinghouse Electric Corp. (Mansfield, O., and Springfield, Mass.).

—o—

Non-Ferrous Perma Mold Inc., a new company jointly owned by Barnes Mfg. Co., Mansfield, O., and Non-Ferrous Die Casting Co. Ltd., London, England, has been incorporated under the laws of Ohio. Factories are in Mansfield.

—o—

Larkin Lectro Products Corp., New York, relocated its entire facilities to a larger plant in Pine Bluff, Ark. From there delivery of arc and resistance welding equipment and power distribution transformers will be scheduled the first of December.

—o—

Platecoil Division of Kold-Hold Mfg. Co., Lansing, Mich., added four representatives: Henry P. Thompson Co., Cincinnati; Power Plant Efficiency Co., Indianapolis; Patton Equipment Co., St. Louis; and W. P. Nevins Co., Chicago. New agencies will help manufacturers work out industrial heating problems.

—o—

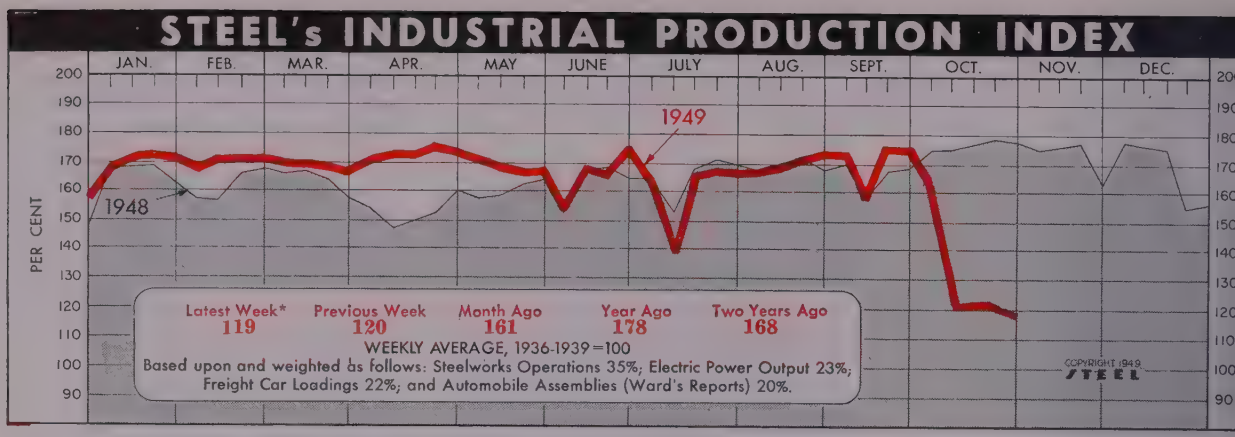
Gould Storage Battery Corp., Trenton, N. J., has combined facilities of its sales, service and warehouse under one roof in San Francisco. The new office will head the Gould western region. C. H. Hart, a specialist in battery applications in materials handling and mine haulage, will be western manager.

—o—

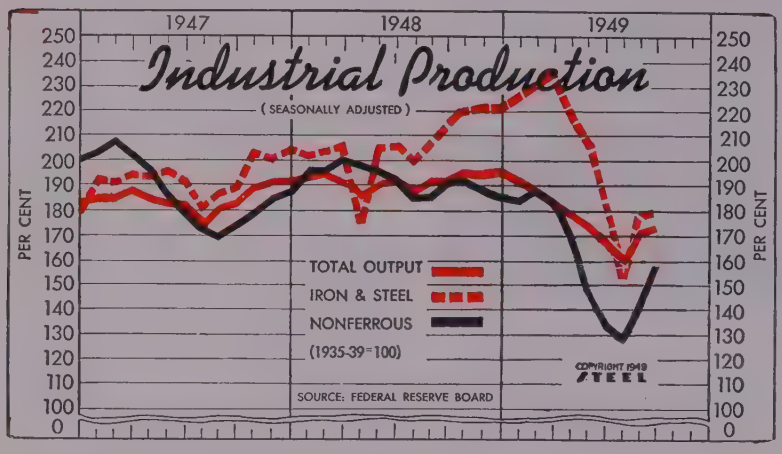
Soldering Specialties, Summit, N. J., manufacturer of solder and brazing alloys for industrial use appointed these regional representatives: Harry Gerber of Gerber Sales Co. in Boston for the New England area; Harry C. Stockfleth of Chatham, N. J., for metropolitan New York; Harold F. Anderson of Detroit for Michigan; and Arthur J. Ellis of Arthur J. Ellis Co., Chicago, for Illinois, Indiana, Wisconsin and Iowa.

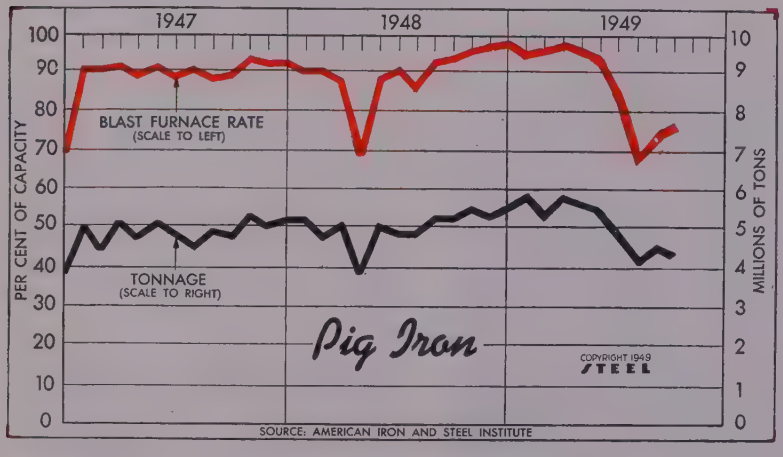
—o—

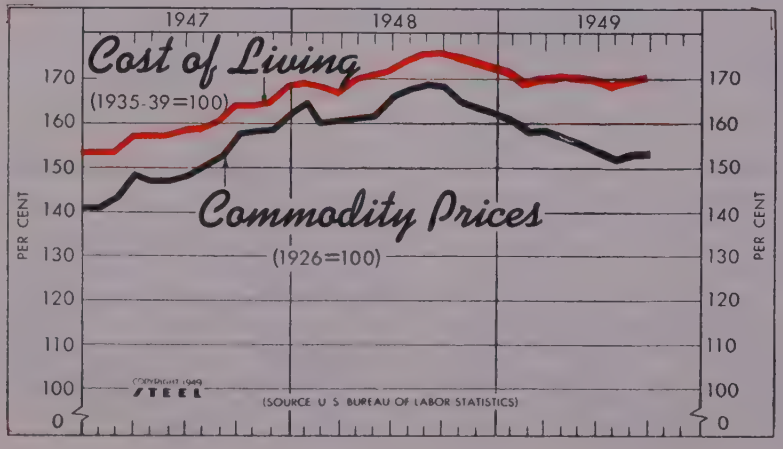
Graver Water Conditioning Co., New York, manufacturer of equipment for water treatment and liquid conditioning processes, established new sales and engineering offices in Cleveland and Philadelphia. Herman Ross heads the Cleveland office, Robert Schenker, the Philadelphia office.


STEEL's INDUSTRIAL PRODUCTION INDEX
JAN. FEB. MAR. APR. MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC.
PER CENT
1949
1948
Latest Week* 119
Previous Week 120
Month Ago 161
Year Ago 178
Two Years Ago 168
WEEKLY AVERAGE, 1936-1939=100
Based upon and weighted as follows: Steelworks Operations 35%; Electric Power Output 23%; Freight Car Loadings 22%; and Automobile Assemblies (Ward's Reports) 20%.
COPYRIGHT 1949 STEEL

* Week ended Oct. 29 (preliminary).







Federal Reserve Board's Production Indexes (1935-1939=100)

	Total Production		Iron, Steel		Nonferrou	
	1949	1948	1949	1948	1949	194
Jan.	191	193	228	203	184	19
Feb.	189	194	232	203	186	19
Mar.	184	192	233	207	183	20
Apr.	179	188	219	177	168	19
May	174	191	204	206	145	19
June	169	192	177	208	132	19
July	162	186	156	201	128	18
Aug.	170	191	178	207	141	18
Sept.	172	191	179	214	156	19
Oct.	...	195	...	221	...	19
Nov.	...	195	...	223	...	18
Dec.	...	192	...	222	...	18
Ave.	...	192	...	208	...	19

Pig Iron*

	Production (Net Tons—000)			Operating Rate (% of Capacity)		
	1949	1948	1947	1949	1948	194
Jan.	5,725	5,194	5,071	95.5	90.9	90.8
Feb.	5,223	4,838	4,550	96.5	90.6	90.3
Mar.	5,820	5,020	5,123	97.1	87.8	91.8
Apr.	5,531	3,840	4,830	95.3	69.4	89.3
May	5,517	5,077	5,081	92.0	88.8	91.0
June	4,819	4,990	4,810	83.0	90.2	89.0
July	4,173	4,900	4,585	69.8	85.9	90.3
Aug.	4,477	5,255	4,916	74.7	92.0	88.1
Sept.	4,351	5,208	4,801	75.1	94.3	89.0
Oct.	....	5,520	5,228	...	96.6	93.6
Nov.	....	5,399	5,015	...	97.6	92.8
Dec.	....	5,595	5,177	...	98.1	92.9
Total	....	60,849	59,210	Ave. ...	90.2	90.1

* Includes ferromanganese and spiegeleisen.

Wholesale Commodity Price—Cost of Living Indexes

	—Commodities— (1926=100)			—Living Cost— (1935-1939=100)		
	1949	1948	1947	1949	1948	1947
Jan.	160.5	165.7	141.5	170.9	168.8	153.3
Feb.	158.1	160.8	144.5	169.0	167.5	153.2
Mar.	158.4	161.4	149.5	169.5	166.9	156.3
Apr.	156.9	162.7	147.7	169.7	169.3	156.2
May	155.7	164.2	147.1	169.2	170.5	156.0
June	154.4	166.4	148.0	169.6	171.7	157.1
July	153.4	168.7	150.8	168.5	173.7	158.4
Aug.	153.0	169.5	153.7	168.8	174.5	160.3
Sept.	153.7	168.7	157.4	169.6	174.5	163.8
Oct.	....	165.2	158.5	....	173.6	163.8
Nov.	....	164.0	159.6	....	172.2	164.9
Dec.	....	162.3	163.2	....	171.4	167.0
Ave.	....	164.9	151.8	....	171.2	159.2

The Business Trend

FURTHER paring of automobile output in the week ended Oct. 29 caused STEEL's industrial production index to drop another point to 119 per cent (preliminary) of the 1936-1939 average from 120 in the preceding week. The current position of STEEL's index is at the lowest point since June, 1946, and 54 points lower than in the last prestrike week.

AUTOMOBILES—Assemblies of passenger cars and trucks declined 2800 units in the week ended Oct. 29 to 140,244 from 143,049 in the preceding week. It was the sixth consecutive weekly decline from the preceding week's total. A sharper decline is in order for the current week as trimmed schedules are forced upon almost the entire industry by shortages of critical steel items. Even with the steel strike's end in sight further shutdowns are expected before inventories are put back in shape for full scale production. The extent and duration of these shutdowns will depend on how soon steel mills will be able to start shipping their products. Scarcity of certain items, particularly wide sheets, is expected to restrict output beyond the first of next year.

COAL—Bituminous coal production remained low in the week ended Oct. 22, output being only 2.5 million tons, about 10 million tons less than in the same week in 1948. Most of the nation's mines were idle because of the United Mine Workers' strike. Only mines operating are those employing Progressive Miners and UMW-operated mines west of the Mississippi.

PRICES—The consumers' price index of the Bureau of Labor Statistics advanced to 169.6 per cent of the 1935-1939 average in the month ended Sept. 15 from 168.8 a month earlier. On Sept. 15, 1948, the index was 174.5.

PRODUCTION — Federal Reserve Board's seasonally adjusted industrial production index continued its rise in September to 172 per cent of the 1935-1939 average. Gains were effected in manufacturing industries but output of minerals declined about 8 per cent during the month. The board predicts October's index will decline about 20 points because of the steel strike. In September, 1948, the index was 192.

BUSINESS—Stock company formations during September numbered 6867, representing only a slight change from August's 6828. Business failures dropped 10 per cent in September to 732 from 810 in August. Despite this decrease, casualties were 84 per cent heavier than in September, 1948. Liabilities in September fell to $20.6 million, lowest total since January and slightly below September of last year.

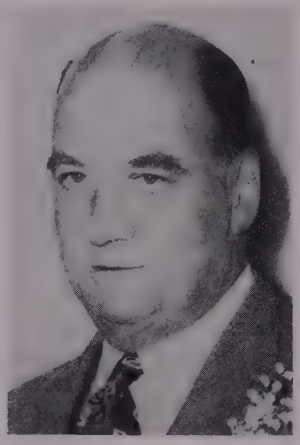
RAILROADS—New locomotives installed by Class 1 railroads in the first three-quarters of 1949 total 1430. Locomotive installations in this period were greater than in any corresponding period since 1923. Association of American Railroads totals show 1381 diesels and 49 steam locomotives installed. In the same 1948 period, 952 diesel, 56 steam and 4 electric locomotives were installed. Class 1 railroads also had 775 diesel, 21 steam and 4 electric locomotives on order on Oct. 1.

BAROMETERS of BUSINESS

		LATEST PERIOD*	PRIOR WEEK	MONTH AGO	YEAR AGO
INDUSTRY	Steel Ingot Output (per cent of capacity)†	9.0	9.5	70.0	99.0
	Electric Power Distributed (million kilowatt hours)	5,433	5,430	5,521	5,555
	Bituminous Coal Production (daily av.—1000 tons)	423	398	337	2,088
	Petroleum Production (daily av.—1000 bbl)	5,075	5,072	4,950	5,652
	Construction Volume (ENR—Unit $1,000,000)	$135.8	$121.5	$163.9	$179.1
	Automobile and Truck Output (Ward's—number units)	140,244	143,049	151,593	116,968
	*Dates on request. †1949 weekly capacity is 1,843,516 net tons. 1948 weekly capacity was 1,802,476 net tons.				
TRADE	Freight Car Loadings (Unit—1000 cars)	580†	589	658	932
	Business Failures (Dun & Bradstreet, number)	221	181	181	104
	Money in Circulation (in millions of dollars)‡	$27,328	$27,427	$27,348	$28,091
	Department Store Sales (changes from like wk. a yr. ago)‡	−14%	−12%	−8%	+12%
	†Preliminary. ‡Federal Reserve Board.				
FINANCE	Bank Clearings (Dun & Bradstreet—millions)	$13,025	$15,216	$13,071	$14,343
	Federal Gross Debt (billions)	$256.6	$256.6	$256.6	$252.3
	Bond Volume, NYSE (millions)	$17.2	$15.9	$13.6	$21.3
	Stocks Sales, NYSE (thousands of shares)	7,706	6,628	6,179	5,395
	Loans and Investments (billions)†	$66.4	$66.2	$66.5	$62.3
	United States Gov't. Obligations Held (millions)†	$37,625	$37,300	$37,874	$33,416
	†Member banks, Federal Reserve System.				
PRICES	STEEL's Weighted Finished Steel Price Index††	152.52	152.52	152.52	151.86
	STEEL's Nonferrous Metal Composite‡	168.9	169.1	175.9	222.3
	All Commodities†	152.5	152.1	152.4	164.8
	Metals and Metal Products†	169.0	169.2	169.2	170.3
	†Bureau of Labor Statistics Index. 1926=100. ‡1936-1939=100. ††1935-1939=100.				

Men of Industry

CHARLES L. HUSTON JR.



ROBERT W. WOLCOTT

WILLIAM M. COWLES

Charles L. Huston Jr., vice president and executive assistant to the president, **Lukens Steel Co.,** Coatesville, Pa., has been elected president, succeeding **Robert W. Wolcott,** president since 1925, who was named chairman of the board. Mr. Huston became associated with Lukens in 1939 after ten years with Armco Steel Corp., Middletown, O. He became vice president in 1948.

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E. Neil Crosier has been appointed secretary and treasurer, **Sharon Steel Corp.,** Sharon, Pa. He will be in charge of all financial matters of the corporation and all subsidiaries. Mr. Crosier has been with Price, Waterhouse & Co. for approximately 20 years, and was a senior manager in the Pittsburgh office. He succeeds **A. J. Watson,** who has reached retirement age but who will continue with the company as assistant secretary. Mr. Watson joined the Sharon organization as secretary and treasurer of Youngstown Pressed Steel, former subsidiary, and transferred to Sharon in 1935.

—o—

Wiley G. Robinett has been elected assistant comptroller, **Gulf Oil Corp.,** subsidiary, Gulf Refining Co., Pittsburgh. **Adam P. Yung** has been elected manager of sales accounting, and **E. F. Franz** as budget director. All three men will report to **W. L. Naylor,** comptroller. **John A. Ellen,** who held the assistant comptroller post since 1933, is retiring. He has served the firm, primarily in accounting and auditing capacities, for the last 40 years.

—o—

George R. Lundberg has been appointed director of advertising and sales promotion by **Osborn Mfg. Co.,** Cleveland. He has been with Osborn 17 years, and for the last two years has been chief accountant.

—o—

N. L. Watkins has been appointed chief development engineer of the Almco Division of **Queen Stove Works Inc.,** Albert Lea, Minn. Prior to association with the division he was with with Westinghouse Electric Corp. for five years as manufacturing engineer at Pittsburgh, and had formerly been associated for six years with Remington Rand Corp., Elmira, N. Y. In addition to his duties at the home office, he will provide technical field service to users of Almco Supersheen deburring and finishing equipment.

—o—

Arthur Smith Jr. has been appointed director of public relations, **Dow Chemical Co.,** Midland, Mich. All public relations activities of the company's several divisions and subsidiaries, including the former editorial service department, will be integrated under Mr. Smith's direction. **L. W. Woodman,** former director of editorial service, will directly supervise institutional publications and releases, while **Eugene E. Perrin** will supervise product promotion.

—o—

J. R. Rose has been appointed sales manager of the western district for **Townsend Co.,** New Brighton, Pa. He will have headquarters in Chicago to co-ordinate company activities of both industrial and jobber sales of rivets, bolts, nails, special metal fasteners and other products in Illinois, Iowa, Missouri, Kentucky, western Ohio, Indiana, Michigan (upper peninsula), Nebraska, Wisconsin, North and South Dakota.

William M. Cowles has been elect sales vice president, **Superior St Corp.,** Pittsburgh. He has been ge eral sales manager of the compa since 1941.

—o—

Eugene C. O'Connell and **Clarence Gabriel** have been appointed ma agers of the San Francisco and De ver sales and service branches, r spectively, for **Independent Pne matic Tool Co.,** Aurora, Ill. M O'Connell formerly served as servi engineer in the Los Angeles bran and Mr. Gabriel was service engine in the company's Salt Lake Ci Utah, branch.

—o—

Harold Meyer has been placed charge of a new district office open in Tulsa, Okla., by **De Laval Ste Turbine Co.,** Trenton, N. J. M Meyer has been handling the sale De Laval pumps, turbines, blow and gears for over six years.

—o—

Gerlinger Carrier Co., Dallas, Ore has appointed **George C. Lichty** assistant sales manager. He has be associated with the firm in rec years as a factory representative.

—o—

A. F. Holden Co., New Haven, Con and Detroit, announces appointme of **Lloyd J. Bohan** as West Coast r resentative. He has been associa with the metalworking industries 14 years, the last two as a manuf turer's agent in southern Californ specializing in heat treating equ ment.

—o—

Cecil R. Pond has been appoin sales representative in Birmingh for **Automatic Transportation** Chicago, manufacturer of materi

For Greatly Improved Press Performance Greatly Reduced Maintenance Time—

the new CLEARING tornadyne
TRADE MARK

clutch and brake unit

Because press performance—and maintenance requirements—are so largely dependent upon the clutch, this newest Clearing development has an important dollars-and-cents significance for every press user.

By reducing the number and weight of the parts which stop and start, Clearing engineers have created a clutch and brake unit which eliminates approximately half of the energy loss common to presses equipped with conventional clutches. That means only half as much heat is developed, so the clutch runs cooler and the power bill is smaller.

Complete elimination of packing and rubbing seals has reduced maintenance needs very materially. Changing friction linings requires no crane or hoist—the whole operation takes well under an hour.

A Clearing press has always been a highly profitable investment from a cost-reducing standpoint. With the new *tornadyne* clutch and brake unit as standard equipment, Clearing presses become still more profitable as production machines.

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- ★ Minimum inertia loss due to small mass of parts that start and stop with each cycle.
- ★ No air cylinder packing. A nylon diaphragm with ¼" travel does the work.
- ★ All-metal labyrinth seals, with no wearing parts, replace leather or composition packings for retaining lubricant.
- ★ All drive shaft bearings, including flywheel, lubricated by automatic system or from floor level.
- ★ Friction inserts easily replaced without disassembly of parts from the press and without need for crane or hoist.

—and many other features.

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The complete story of the Clearing *tornadyne* Clutch, with all its features described and illustrated, is available in a new bulletin. A copy will be sent free at your request.

CLEARING PRESSES

THE WAY TO EFFICIENT MASS PRODUCTION

handling equipment. His territory includes Alabama and the northwestern part of Florida.

—o—

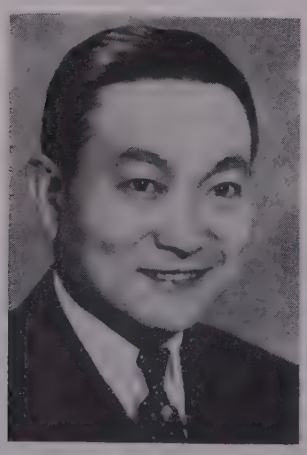
Robert A. Speck and **George R. Milne** have been appointed vice presidents of **National Carbide Corp.,** New York. Mr. Speck will be in charge of sales and distribution, and Mr. Milne in charge of operations. Mr. Milne will continue to have headquarters in Louisville in order to remain close to company manufacturing operations. **Russell T. Lund** has been appointed operating manager, responsible for operating practice, procedure and methods at all plants. He will report to Mr. Milne, and will remain at Louisville. **Astor Brown** has been named acting works manager at Ivanhoe, Va., and **Clarence G. Burnham,** controller. **George R. Fuller** continues as general sales manager. **W. P. Metcalf** has been appointed purchasing agent, and **R. J. Niebanck** becomes technical assistant to **J. Carl Bode,** president.

—o—

James C. Sinnigen, management and public relations consultant and industrial executive for 25 years, has joined **Pendray & Leibert,** public relations firm, New York. He will specialize in public relations counseling and projects for industrial concerns and business organizations. From 1943 to 1945 he was chief management engineer and executive assistant to Republic Aviation Corp.'s vice president-general manager, and was previously production manager and assistant to the general manager of Fairchild Airplane & Engine Corp.

—o—

G. K. Iwashita has been appointed



G. K. IWASHITA

manager of product planning, air conditioning department, **General Electric Co.,** at Bloomfield, N. J. He previously was manager of product research, Seeger Sunbeam Corp., Evansville, Ind. He served in various engineering and product planning positions with manufacturing companies since 1928, and now holds 23 patents covering air conditioning and refrigeration machines.

—o—

L. R. Kerns has severed connections with **L. R. Kerns Co.,** Chicago, and his interest has been purchased by a group of employees who will retain the name of the company. New officers are: **B. L. Smalley,** president; **S. F. Gordon,** vice president; **D. E. Fredericks,** vice president; and **M. H. Schellenberg,** secretary-treasurer.

—o—

Erling G. Fossum, associated with Stewart-Warner Corp., Chicago, since 1926, has been appointed general manager of **Stewart-Warner Electric,** the company's radio and television division. He fills the vacancy created by the recent resignation of **Samuel Insull Jr.** Mr. Fossum has been assistant to the president for the past year, and was formerly service manager of Alemite, instrument and heater divisions.

—o—

W. J. Corr has been appointed to the newly created post of director of service for **Mack Trucks Inc.,** New York. Combining former service engineering and general service departments under his command, Mr. Corr will oversee all parts and service activities for trucks, busses and fire apparatus in Mack's eight major selling divisions in the United States and Canada and its 67 direct factory branches. He will have headquarters at Mack's Plainfield, N. J., plant.

—o—

Francis B. Dunn has been appointed

FRANCIS B. DUNN

manager of the Houston Works of **A. O. Smith Corp.,** Milwaukee. **C. W. Wheatley,** who had been assigned temporarily to building up the postwar management of the Houston Works, has returned to Milwaukee where he will resume work on t general staff, handling problems ass ciated with materials requirements the company.

—o—

Jack Victorine has been appoint

JACK VICTORINE

general sales manager, **Cooper All Foundry Co.,** Hillside, N. J., and M **ton C. Meyers** appointed assista sales manager. Mr. Victorine h been connected with the stainl casting field at Cooper Alloy for t last 17 years, and has been sales ma ager for the last eight years. M Meyers has been associated with t company for the last 12 years, a since 1945 served as direct assista to Mr. Victorine. **J. L. Lessman** h been appointed manager of valve a fitting sales.

—o—

F. P. Rogers has been appointed re resentative for the Butterfield Di sion, **Union Twist Drill Co.,** in Oreg and Washington.

—o—

Paul Linz has been named chairm of the board of directors of **Sou American Minerals & Merchandi Corp.,** New York. He continues personal assistant to Dr. Mauri Hochschild in all his enterpris "Samincorp" represents the Hoc schild interests in Peru, Bolivia, Chi Argentina and Brazil as importe of ores and concentrates and e porters of metals, machinery, st products, chemicals and pharmace ticals.

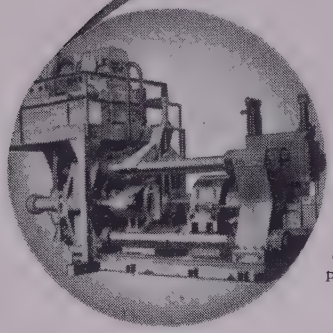
—o—

Wesley L. Dinsmore and **William Donaldson** have been appointed d trict managers of **Chicago Vitreo Enamel Product Co.,** Cicero, Ill. M Dinsmore will be in charge of t New England territory, and M Donaldson of the east central stat

—o—

A. C. Cronkrite, vice president, ce tral region sales, Chicago, **Univers**

ever wonder why...



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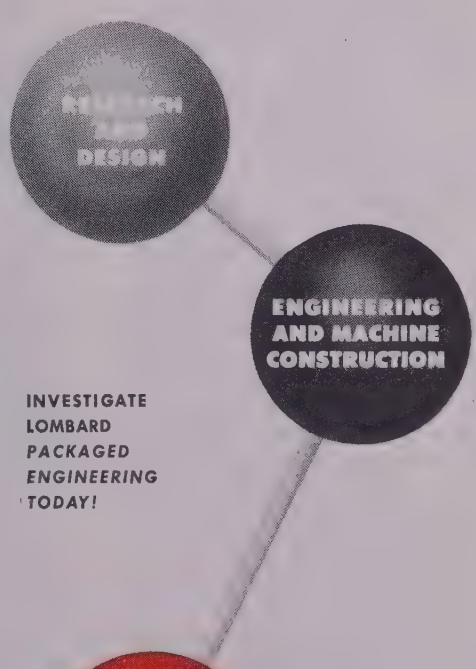

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E UIPMENT MANUFACTURED BY UNITED ENGINEERING AND FOUNDRY CO., PITTSBURGH, PA.

Atlas Cement Co., subsidiary of U. S. Steel Corp., celebrated his 50th anniversary with the corporation Oct. 4.

—o—

Mark Gardner has been elected president, **International Derrick & Equipment Co.,** Cleveland, subsidiary, Dresser Industries Inc. He will make his headquarters in Dallas, where the company's headquarters are being moved. Mr. Gardner, who was also elected a director of Ideco, succeeds **Oscar M. Havekotte,** president from 1940 until his recent resignation. Mr. Gardner was associated for a number of years with Phillips Petroleum Co., resigning in 1946 to accept the post of vice president of Loffland Bros. and its foreign subsidiaries.

MARK GARDNER

—o—

David Lewis, former executive with Noma Electric Corp., New York, has been appointed general sales manager, Lycoming-Spencer Division, **Avco Mfg. Co.,** New York. In this newly created position Mr. Lewis supervises sales of aircraft and industrial engines and related products, machine parts, gray iron castings, and residential and commercial boilers produced by the division's two plants at Williamsport, Pa. **R. C. Cosgrove** has resigned as executive vice president of Avco, and the position has been abolished with his resignation. Mr. Cosgrove was vice president and general manager of Crosley Corp., sold to Avco in 1945. He remains with the company as a member of the board in a consulting capacity, and will continue to represent the Crosley Division in the Radio Manufacturers Association, of which he is president.

—o—

A. C. Scates has been named sales representative in Mississippi and Louisiana and in the southern portion of Arkansas for **National Radiator Co.,** Johnstown, Pa. His headquarters will be in Jackson, Miss. Mr. Scates served for many years as manager of N. O. Nelson Co.'s branch office in Jackson.

—o—

Samuel F. Newman, chairman of the board of directors of **Landis Tool Co.,** Waynesboro, Pa., recently completed 50 years of service in the machine tool industry. He was guest of honor at a dinner tendered him by Landis Tool board of directors and company officers.

—o—

Walter G. Koch, former senior vice president and executive officer, **International Steel Co.,** Evansville, Ind., has been elected president following election of **Henry Bohnsach,** former president, as chairman of the board. Mr. Koch joined the company 27 years ago. **Wesley D. Hamilton** has been named vice president and director of sales.

—o—

Elias C. Atkins III, formerly manager of mill sales, has been promoted to assistant to the vice president, **E. C. Atkins & Co.,** Indianapolis. He will make his headquarters at the Portland, Oreg., factory branch.

ELIAS C. ATKINS III

—o—

Federated Metals Division, **American Smelting & Refining Co.,** has expanded its business in electroplater's anodes through acquisition of production facilities of Metallurgical Products Co., Philadelphia. Production will will be concentrated at the division's Perth Amboy, N. J., plant under the management of **R. D. Taylor.** The technical staff of Federated will be assisted by **I. W. Wilenchik** of Metallurgical Products Co., and the alloy and specialty products business of Metallurgical Products Co. will be conducted by Mr. Wilenchik from his company's Philadelphia plant, as in the past.

—o—

Robert C. Howard, district manager for the last 11 years for the com tometer division, **Felt & Tarrant M Co.,** has been appointed manager the Los Angeles district office. **C A. Lomatch,** Omaha district manag succeeds Mr. Howard.

—o—

Arthur E. Franks has joined t metals research department, **Natio Research Corp.,** Cambridge, Mas where he will be engaged in dev opment of new products and of hi vacuum furnaces for metallurgi processing.

—o—

Pittsburgh Steel Co., Pittsburgh, a nounces appointment of **Charles McBride** as traffic consultant, a **Richard N. Shields** as general traf manager.

—o—

Laurence V. Britt has retired chairman of the board and of t executive committee of **Burroug Adding Machine Co.,** Detroit, b will continue as a director.

—o—

J. T. Mathews has been appoint manager of the foreign engineeri department, **Westinghouse Elect Corp.,** Pittsburgh. He succeeds **E. Schroeder,** retired after 26 years service with the company. **Marv W. Smith,** president of Baldwin Loc motive Works, has been elected director of Westinghouse.

—o—

Kermit R. Sadler has been appoint general traffic manager, **B. F. Goo rich Co.,** Akron. He has served sin 1943 as manager of traffic and wa housing at the company's Los Angel plant. He succeeds **R. W. Corns,** r signed.

—o—

Fred H. Fick has been elected secr tary, **International Business Machin Corp.,** New York. He has been assis ant secretary since 1947, and ass ciated with the company since 192

FRED H. FICK

B. Ornitz, vice president, **Blaw-**

N. B. ORNITZ

nox Co., Pittsburgh, has been ap-inted manager of foundry opera-ons in the Pittsburgh district, a new sition created in connection with e improvement program in progress three of the company's foundry ants, and is in addition to Mr. nitz's other duties. He founded the ational Alloy Steel Co. in 1927. This it, located at Blawnox, Pa., be-me part of Blaw-Knox Co. in 1929. r. Ornitz became a director in 1935 d a vice president in 1937.

R. M. Westveer has been appointed

R. M. WESTVEER

general manager, Bassick-Sack Division, **Bassick Co.,** at Winston-Salem, N. C., filling the vacancy created by death of **Ray M. Martin** in September. Mr. Westveer joins Bassick-Sack after two years with Chautauqua Hardware Co., Jamestown, N. Y., and 25 years with Keeler Brass Co., Grand Rapids, Mich., where he worked in various capacities, principally in production and sales. The Bassick Co. is a subsidiary of Stewart-Warner Corp., Chicago.

Curtis D. Cummings has been ap-

CURTIS D. CUMMINGS

pointed sales manager, **Allison Co.,** Bridgeport, Conn., manufacturer of abrasive cutting wheels. Associated with SKF Industries Inc. for 12 years, he served that company as sales engineer, and more recently as manager of its industrial sales department. During the war he was a consultant in the bearings branch of the Tools Division, War Production Board. Prior to his work at SKF, Mr. Cummings was an aeronautical engineer with Consolidated Aircraft Corp.

OBITUARIES...

J. Jennings, 54, vice president in harge of sales, **Cleveland Worm & ear Co.,** Cleveland, and of its asso-ate company, **Farval Corp.,** died Oct. following a heart attack. He began s business career with E. F. Hough-n Co., Philadelphia, and after 14 ears left Houghton to become vice resident and general manager of ubrication Devices Inc., Battle Creek, ich., predecessor company to Farval orp. and a pioneer manufacturer of entralized systems of industrial lub-cation. Mr. Jennings went to Cleve-nd in 1932 when Farval was pur-hased by Cleveland Worm & Gear o.

—o—

dward R. Stettinius Jr., 49, former ecretary of State and one-time chair-an of the **United States Steel Corp.,** ed Oct. 31 of a heart attack. He ecame affiliated with U. S. Steel 1934. On June 4, 1940, he left . S. Steel to engage in government efense work. In late 1944 he became ecretary of State, serving for eight nonths, and later served on the Pre-aratory Committee of the United Nations Organization, with the title f ambassador. He resigned that

A. J. JENNINGS

position in 1946, subsequently becoming rector of the University of Virginia.

—o—

Andrew S. Miller, 75, a founder of **Irvine Forge & Steel Co.,** Irvine, N. Y., died Oct. 27. The plant began operations in 1911 and later became the **National Forge & Ordnance Co.**

—o—

C. V. Kerr, 88, inventor of first steam turbine to be used in merchant ships, and early leader in the development of the modern steam turbine, died Oct. 30. He was president, Kerr Auxiliary Co., Chicago, from 1914 to 1916, and steam turbine engineer for American Well Works Co., Aurora, Ill., from 1916 to 1921. He later was president, **National Pump & Motor Co.**

—o—

Harry H. Rinquest, 37, Fresno, Calif., branch manager, **International Business Machines Corp.,** died Oct. 28.

—o—

F. A. Wickerham, 66, assistant to the vice president in charge of research and technology, **Carnegie-Illinois Steel Corp.,** Pittsburgh, died Oct. 20.

—o—

L. Royal Hooper, 55, superintendent of steel control for **Cleveland Hardware & Forging Co.,** Cleveland, and its predecessors for 30 years, died recently.

—o—

Harry B. Stewart, 56, executive vice president and general sales manager, **Metal Tube & Housing Co.,** Dover, N. J., died Oct. 30.

—o—

Val Hansel, 42, New York sales manager, **Peter A. Frasse & Co. Inc.,** New York, died Oct. 25. He joined Frasse in 1925, and was appointed sales manager in New York in 1939.

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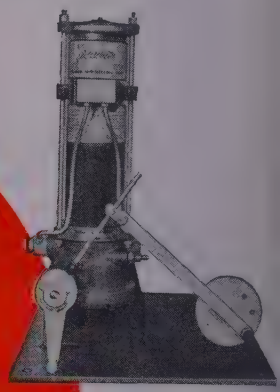

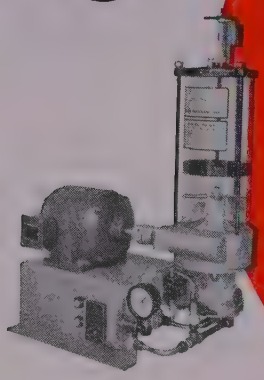

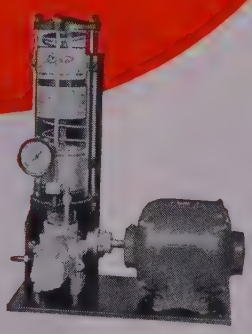

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Production AND Engineering
NEWS AT A GLANCE

MPLIFIES RESEARCH DATA—Extremely valuable re-arch information is currently obtained by dynamic strain-ging equipment at the research laboratory of National Tube o., Pittsburgh. Loads on the plug and bar while seamless eel tubing is rolled in the high mill is determined instan-neously by the setup. In another case, figures are obtained strains and stresses set up in a drill pipe joint while the int is being assembled, and later, while the joint is tested bending.

IGHER HIGH TEMPERATURE ALLOY— A metallic com-ound, zirconium boride, developed under an Office of Naval esearch contract, can withstand temperatures up to 600° F e Department of Defense reveals. The compounding pro-ss, using zirconium and boron, provides an alloy which rvives higher temperature blasts than any material tested tensively to date. It may be used in modern gas turbines, d in jet and rocket engines.

OOL ROOM TIME SAVER— Time-saving tool room cessory for tool room and semiproduction lathes currently uilt by Elwood Products Co., Detroit, saves 3 to 10 minutes every job. A micrometer stop and lathe carriage spacer mbined, it permits faster, more accurate setting for boring les to greater depth, accurately spacing shoulders, grooves d undercuts on all turning jobs.

WO-IN-ONE JOINING— Advantages of fusion welding d brazing minus their disadvantages are combined in a w welding method developed by Uniworld Research Corp. America, Cleveland. According to the company, the de-lopment vitally improves the weldmetallurgy of steels in neral. This is done by reducing heat input and by the use a new type bond. The process may be used in joining and uilding up without fusion both ferrous and nonferrous etals and alloys.

ENETRATING DEVICE— Ultrasonics or high-frequency und waves will prove immensely useful to industry in the ar future, it is predicted. According to Norman F. Barnes, eneral Electric engineer, ultrasonic energy can be em-oyed in many places where it is difficult to place other pes of energy. He pointed out that it is possible to con-ntrate a kilowatt, nearly 1 horsepower, in the form of und into an area a centimeter square. This is ten times e concentration of power in a white-hot tungsten lamp ament. Recent experiments indicate sound waves may useful in mixing alloys.

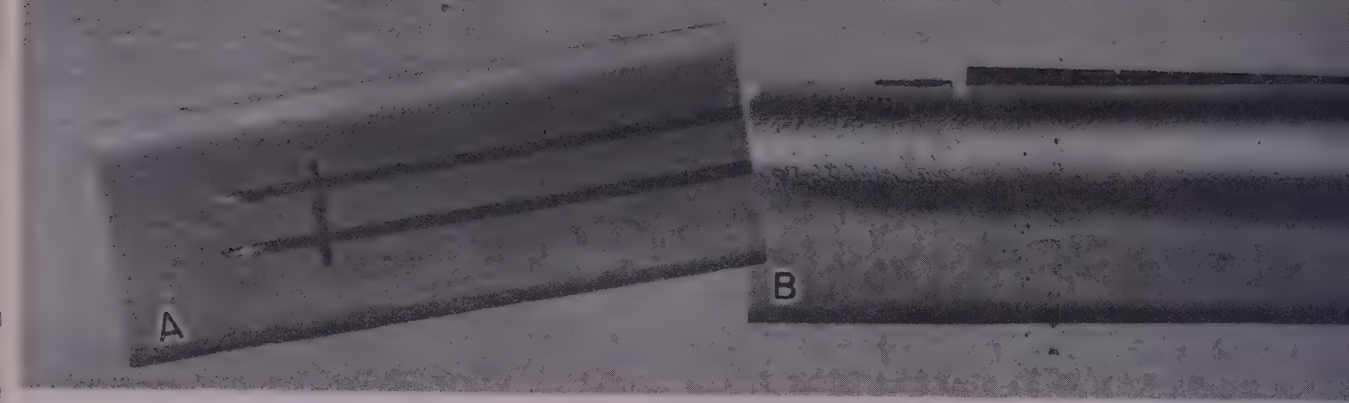
EATLESS WELDING—Revolutionary new process of weld-g metals without electricity or any applied heat soon will available to American industry, according to William ubilier, founder and technical director of Cornell-Dubilier lectric Corp. American rights are now vested in the hands a group of business men forming the Koldweld Corp., he vealed. The process which is used for many applications England, can be employed with metals of any thickness, m very thin foil of less than a thousandth of an inch to e heaviest metals. It is believed the development will ange drastically current practices in industrial and job lding, particularly where aluminum is involved.

CHROMIUM PLATING STEEL—Advantages of chromium plating in the absence of proper precautions may be offset by the adverse effect of the plating on the fatigue limit of the base metal, according to extensive studies made recently. Hugh L. Logan, National Bureau of Standards, Washington, in examining the effect of chromium plating on the fatigue limit of aircraft steels—under sponsorship of the Navy's Bureau of Aeronautics—discovered some information of interest not only to aircraft manufacturers, but also to other industries that produce or use chromium-plated parts. (p. 110)

CUPPING THICK BLANKS—Cupping of thick steel blanks is not yet well understood. Principal difficulty seems to be in obtaining an even cup with a uniform wall thickness. Theoretically, it is pointed out, reduction in thickness in the cupping operation should be slightly smaller than it is during a redraw, because thickness of a blank edge increases during cupping so long as the clearance between die and punch is sufficiently large to avoid ironing. For a 30 per cent diameter reduction, increase in thickness at the edge of the mouth would be about 15 per cent. Thickness reduction of 50 per cent of the blank thickness would therefore actually be almost 60 per cent reduction by ironing in the wall thickness of the cup—if such a cup is formed without first ironing (p. 112)

PROMOTES HARDNESS—Chief advantage of a casting method employed by Electronicast Inc., Chicago, is the ability to cast metals possessing high melting points and extreme hardness. It is particularly adaptable to small parts—up to 5 pounds—of intricate design where strength must be high and cost of machining operations prohibitive. (p. 116)

CUTS GRINDING TIME—Savings of 50 to 60 per cent are not unusual in jobs involving grinding of small templates, gages, and component parts of stamping, piercing or forming dies by a procedure devised at Cincinnati Milling Machine Co. The grinding method makes use of an optical projection system that not only confines each task to only one setup but enables an operation to be carried through from start to finish without interruption. (p. 118)



How Chromium Plating Affects

Fatigue Life of Aircraft Steels

Advantages of chromium plating, in the absence of proper precautions, may be offset by adverse effect of plating on fatigue limit of the base metal. Aircraft manufacturers and other users of chromium-plated machine parts will be interested in these constructive findings of National Bureau of Standards investigators working on SAE X4130 and 6130 steels

IN ADDITION to decorative use on such articles as automotive headlights and bathroom fixtures, chromium plating is widely used on gages, cylinder walls, piston rings, and other machine parts where resistance to wear is an important factor. However, the advantages of chromium plating, in the absence of proper precautions, may be offset by the adverse effect of the plating on the fatigue limit[1] of the base metal. Recently Hugh L. Logan of the National Bureau of Standards made an extensive study of the effect of chromium plating on the fatigue limit of steels used in aircraft. This investigation,[2] sponsored by the Bureau of Aeronautics, Department of t Navy, provides information of interest not only aircraft manufacturers but also to a number of oth industries which produce or utilize chromium-plat machine parts.

Specimens about ¼-inch in diameter were m chined from three lots of SAE X4130 rod and o lot of 6130 rod, (see accompanying table). T X4130 steel was either normalized to a Rockw

Fig. 2 (left)—Relationship between endurance limit and plate thicknesses of SAE X4130 and 6130 steels

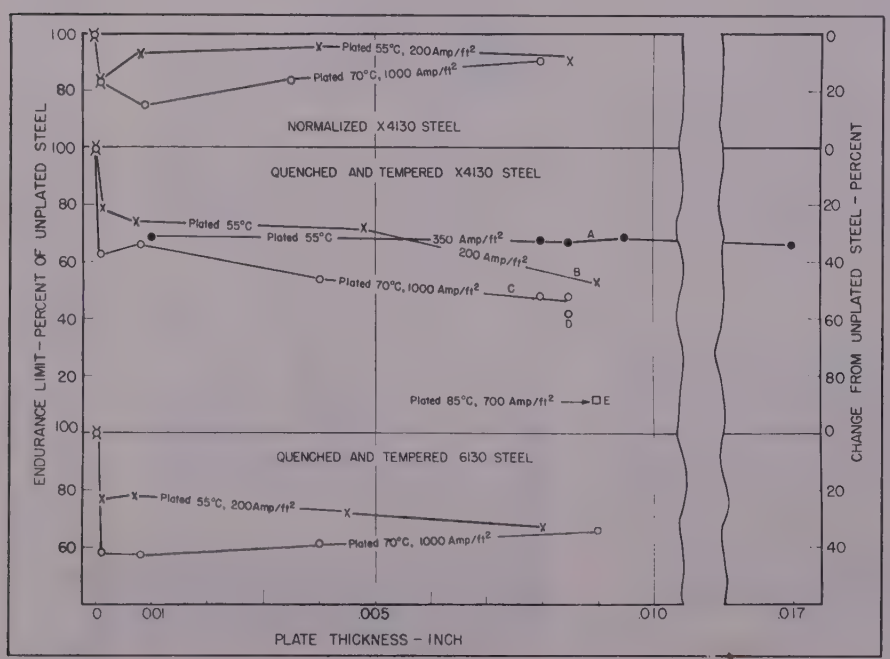


Fig. 3 (below)—Effect of baking te perature on fatigue limit of SAE X41 steels in experiments carried out at N tional Bureau of Standards. Circles i dicate specimens baked in air and cros es specimens baked in organic liqui

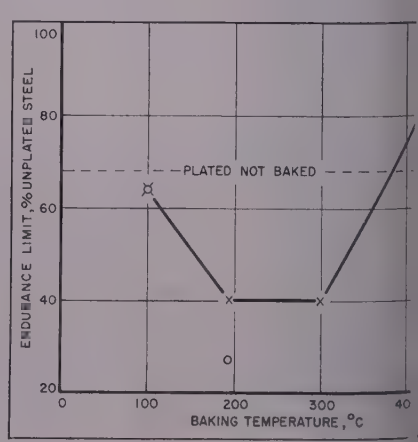


Fig. 1—Effect of heat treatment on residual stresses in chromium-plated steels was illustrated by means of "tongues" cut in thin-walled tubes of annealed steel. (A) Top view of tube showing tongue; (B) (C) (D) side views of tubes showing deflection of tongue. (B) Tube plated, heated at 200° C, and tongue subsequently cut. (C) Tube plated, tongue cut and tube subsequently heated at 200° C. (D) tube plated, heated at 440° C, and tongue cut; a 3/16-inch ball bearing (indicated by arrow) is resting on depressed tongue surface

rdness of 90-B or quenched and tempered to a rdness of about Rockwell 40-C, while the 6130 el was quenched and tempered to a Rockwell hardss of 33-C. After grinding, polishing and chromi--plating, the specimens were subjected to fatigue ts in the R. R. Moore type of rotating-beam maine operating at 1800 or 3600 rpm. Eight or 10 ecimens usually were required to obtain the fatigue it for any one set of conditions.

Fatigue Limits Reduced—In all cases, chromium ting was found to reduce the fatigue limits of the els studied, although the effect was less pronounced der some conditions than others. In general, the duction in fatigue limit increased with increased dness of the steels. For steel of a given hardness, fatigue limit decreased with increased temperature the plating bath. While plate thickness appeared to ve little effect on the fatigue limit of specimens ted in a bath at 55° C and a current density of amp per square foot, no generalizations could be de regarding the effect of this factor at other rent densities and temperatures, Fig. 2.

t was discovered that the fatigue limits of specins plated and subsequently ground to remove a t of the plating were equal to or greater than se of specimens initially plated to the same thicks as the ground specimens and tested as plated. her experiments showed that interruptions of the ting process did not reduce the fatigue limit of plated specimens provided proper precautions were en for continuing the plating.

Chromium-plated objects often are heated to tematures between 90° and 200° C with the object improving their mechanical properties by expell- the hydrogen deposited with the chromium. A tematic study was therefore made of the effect heating on the fatigue limit of chromium-plated tel. The results showed that the fatigue limits of quenched and tempered specimens heated after plating decreased to a minimum value for some heating temperature between 100° and 300° C and thereafter increased with increased heating temperatures, Fig. 3. Fatigue limits of specimens heated for 1 hour at 440°C in some cases were 87.5 per cent of that of the unplated steel, whereas fatigue limits of specimens plated but not heated, and of specimens heated 1 hour (in air) at 193° C, were only about 68 and 27 per cent, respectively, of those of the unplated steel.

Causes of Adverse Effect—Three possible causes for the adverse effect of chromium plating on the fatigue limits of the steels were: (1) Embrittling effect of hydrogen deposited with the chromium, (2) cracks in the chromium, and (3) residual stresses in the chromium. However, it was shown that there was no simple relationship between the fatigue limit and the amount of hydrogen remaining in the chromium after a baking treatment. Further experimental evidence indicated that cracks present in the chromium were not the principal cause of the reduced fatigue limits of the plated steels.

It is generally agreed that residual stresses in a material markedly affect its fatigue limit. Thus, in steel, compressive stresses, such as are produced by shot peening, increase the fatigue limit; tensile stresses have the opposite effect. In order to show the presence of tensile stresses in electrodeposited chromium and the effect of heat treatment on these stresses, thin-walled tubes of annealed steel were chromium-plated and subsequently heated to different temperatures. "Tongues"—strips about 3/16-inch wide 2 inches long, with one end left attached—were then cut in the tubing, Fig. 1, to permit a qualitative evaluation of stresses in the chromium plate.

Tongues cut in plated tubing that had not been heated were found to bend slightly outward from the surface of the tube, indicating the presence of residual tensile stresses in the plated layer. Baking the plated tubes at temperatures around 200° C was found to increase further the tensile stresses in the chromium, as shown by the greater bending of the tongue away from the tube surface.

Increased Tensile Stresses—From these observations, it was concluded that the decreased fatigue limit accompanying the heating at 200° C of the plated fatigue-test specimens was due to increased tensile stresses induced in the chromium plate. This conclusion has been further substantiated by experiments showing that electrodeposited chromium subjected to a heating-and-cooling cycle increases in density and thereby contracts; since (*Please turn to Page* 142)

Maximum stress a part will withstand without failure for a ified large number of repeated or cyclic stresses.

For further details see, "Effect of Chromium Plating on the Enance Limit of Steels Used in Aircraft," by Hugh L. Logan, J. Research NBS 43, 101 (1949) RP2011.

By G. SACHS
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Applicability of this cold forming technique to successful fabrication of parts the size of 0.30-caliber cartridge cases hinges on several fundamental points. In this first section of a two-part article the authors review experimental methods used to study cupping phenomena, contours of cupping dies, stress and strain relations, breaking conditions, cupping and ironing forces

Cupping Thick Ste

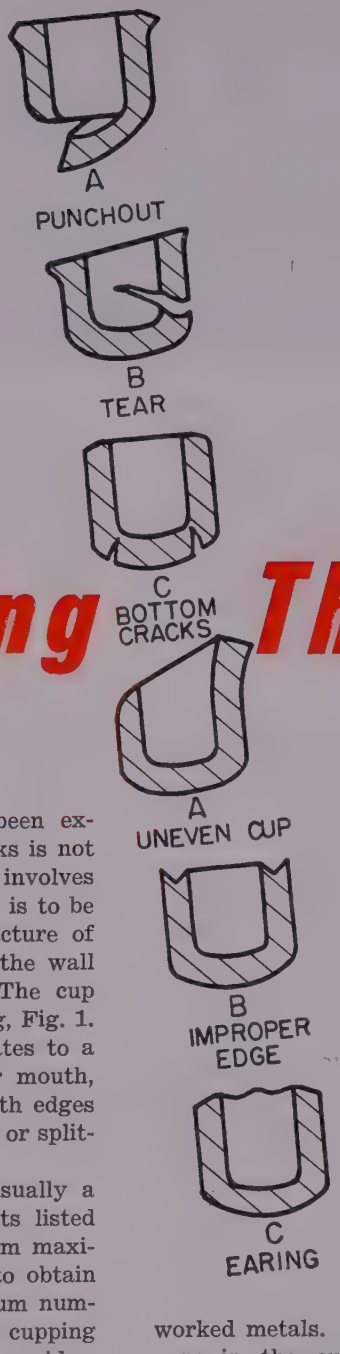


Fig. 1 (top)—Types of failures on cupping thick metal
Fig. 2 (bottom)—Two types of defects in thick cups

ALTHOUGH cupping of thin blanks has been explored thoroughly, the cupping of thick blanks is not well understood as yet. Successful cupping involves the following definite requirements if the cup is to be suitable for redrawing, such as the manufacture of cartridge cases and other articles in which the wall is subjected to considerable ironing: (a) The cup must be formed without breakage or cracking, Fig. 1. (b) It must be uniform in shape. This relates to a uniform wall thickness and an even top or mouth, Fig. 2, as well as to the contour of the mouth edges which must permit redrawing without tearing or splitting at the mouth.

Size of the cup in commercial work is usually a compromise between the quality requirements listed above under (b) and the tendency to perform maximum reductions in this operation, in order to obtain a final drawn-piece with the use of a minimum number of operations. These reductions during cupping consist of two components which are to a considerable extent independent, the reduction in diameter and the reduction in wall thickness, respectively.

The limiting reduction in diameter can be expressed, according to numerous investigations, in the simplest manner by the ratio of the minimum punch diameter which can be used without causing breakage to the blank diameter.

Minimum Punch Diameters—For most metals of deep drawing quality and tools of favorable contour, the minimum punch diameters are approximately 45 per cent of the blank diameter. A smaller punch will cause a punch-out of the cup bottom, Fig. 1. If the above limiting condition can be applied to thick metal where the cup wall thickness is anywhere between 5 and 10 per cent of the blank diameter, the possible minimum (outside) cup diameter would be between 55 and 65 per cent cent of the blank diameter, or the maximum reduction in diameter would be between 45 and 35 per cent.

Maximum reduction thickness, which can be tained if the wall of a tub part is ironed is well over per cent. This has b found to be true for redr ing brass shells as well as the fundamentally ident process of drawing tub with a moving mandrel either annealed or c worked metals. Theoretically, the reduction in th ness in the cupping operation should be slig smaller than is possible during a redraw, because thickness of the edge of a blank increases du cupping as long as the clearance between die punch is sufficiently large to avoid ironing.

For a diameter reduction of 30 per cent, this crease in thickness at the edge of the mouth wo be approximately 15 per cent. A reduction in th ness of 50 per cent of the blank thickness wo therefore actually be almost a 60 per cent reduc by ironing in the wall thickness of the cup, if suc cup is formed first without ironing. Commercia the possible maximum reduction in thickness f the blank thickness to the thickness of the edg the cup has been found to be in the vicinity of per cent. If a much higher reduction in wall th ness is attempted, the wall of the cup will tear, Fi

Contour of Cupping Die—According to the al considerations, one of the factors which should af

possible maximum reduction in thickness from the
ak to the cup is contour of the cupping die. The
tour determines the overlapping of the two re-
tions in cupping, namely, thickness reduction and
meter reduction, and it consequently determines the
ual reduction in thickness. However, no informa-
n is available in this direction.
easons for the combination of rather small diam-
reductions with quite large reductions in thick-
s in commercial cartridge case drawing are not
wn definitely. However, it appears that the prin-
al difficulty in cupping very thick metal is ob-
ning an even cup with a uniform wall thickness.
order to achieve this purpose, a tandem die ar-
gement has been recommended, Fig. 3. The top
principally folds the metal with little reduction in

lanks

l thickness, while the bottom die centers the pre-
ned cup and irons the wall.
ontour of the die working face appears to be of
jor influence on the shape of the cup edge. A V-
ped edge, Fig. 2b, is very difficult to avoid in steel.
h an edge is undesirable for it results in the forma-
of a lap during redrawing, and eventually leads
failure. Such a condition might require trims
erwise avoidable and/or decrease the maximum
sible reductions in the redraws.
Earing" on cupping, Fig. 2c, is a defect of minor
ificance, which only slightly affects the trimming
wance. It results from a preferred orientation in
metal, and it is not affected by the tool design.
Many different die contours are commercially used,
4. These die contours are mostly of one of two
es: They are either flat on top and tapered at
bottom, the two parts being blended by a small
us, Fig. 4a, or the die is wide open or bell shaped
the top and also tapered at the bottom, Fig. 4b.
half die angle of the tapered part may be as small
5 degrees, or as large as 20 degrees. The larger
die angle, the lower is the radial force which tends
burst the die, and the outside diameter and/or
kness of the die may be correspondingly decreased.
this reason probably, cemented carbide dies which
e a low tensile strength usually are made to a
e die angle. Little is known fundamentally re-
ding the proper shaping of the upper part of the
contour. This part of the die is important; it de-
nines, to a considerable degree, the shape of the
edge. Draw forces also depend upon die contour.
upping dies are made from hardened steel or ce-
ted carbide. The cupping punch may be either
red or cylindrical, and usually possesses a ra-
ed tip. There does not seem to be much differ-
between the performance of cups formed on
er tapered or cylindrical punches, the deciding factor apparently being the wall thickness at the edge. The maximum possible taper is determined by the fact that the ratio of the wall thicknesses at top and bottom, respectively, should be smaller for the cup than for the final drawpiece. The punch tip radius may be 100 per cent of the blank thickness for large cases and less than 50 per cent of the metal thickness for smaller cases. This radius should permit the forming of the final contour of the head by progressive slight changes during the various draws.

Material and Procedure—Steel used throughout this investigation was received in the spheroidized condition in the form of strip 1.25 inches wide and 0.147-inch thick. The analysis was 0.35 carbon, 0.64 manganese, 0.013 phosphorus, 0.024 sulphur and 0.14 silicon. Blanks of various diameters were sheared to dimensions using clearances listed in Table I.

Majority of the blanks were cupped in the as-blanked condition without cleaning or copper flashing, in order to approach the actual conditions of commercial fabrication. There was no apparent difference between the cups fabricated in this manner and those made with thin copper deposit on surface.

Cupping operations were performed on a 10,000/60,000-pound hydraulic testing machine having a maximum speed of 2½ inches per minute, or on a mechanical crank press having a speed of 90 rpm.

In all cases it was found to be extremely important that proper guiding of the tools and blank be maintained. Therefore, rings to position the blank and punch guides were used which had been ground to close tolerances to fit the die shoe and the punch, respectively, so that blank, punch and die were lined up as accurately as possible.

Dies for these tests varied in contour and size and are listed in Table II. Most of the dies were straight taper construction with a radius at the opening of the die. A few of the dies, however, contained as many as three angles which were broken by radii so that no sharp corners were present in the die. The radii at the opening of the dies were the same in most cases, although a number of dies, having a 7-degree half die-angle but different die radii were also used to study the effect this variable would have upon the resulting cup.

Polished cylindrical punches ranging in size from 0.400 to 0.600-inch and having tip radii of 0.060-inch were employed. Lubricant used in the cupping process was a 50 per cent water solution of a commercial fat-soap lubricant with filler.

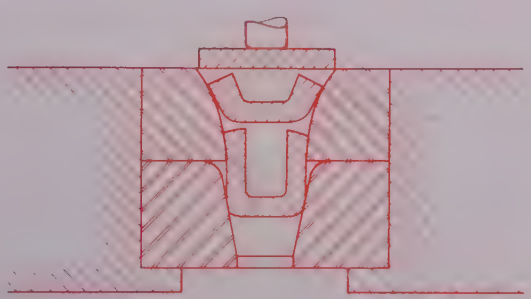


Fig. 3—Schematic representation of cupping in a tandem die arrangement

s article summarizes some results of recent experimentation con-
d at Case Institute of Technology, Cleveland, as part of an in-
gation sponsored by Frankford Arsenal, Philadelphia.

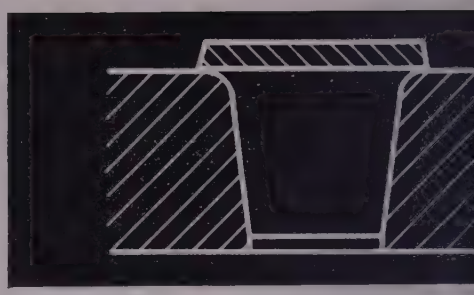
Stress and Strain Relations in Cupping—Before discussing the effect of variables on the cupping process, it is necessary to explain the general stress and strain relations during cupping. As previously mentioned, cupping reduces the initial blank both in diameter and in thickness. These two reductions represent two components of the cupping procedure which are fundamentally independent of each other. It is feasible to perform a cupping operation without any reduction in wall thickness. In fact, such a cupping proper is more comomn for thin metal than cupping with simultaneous wall thinning or ironing.

Ironing can be added then as a sepaarte operation or by the assembly of two dies in tandem, Fig. 3. Such a tandem cupping has been recommended in order to improve the evenness of the cup.

In this procedure, the force-stroke curve will be comprised of the two independent respective force-stroke curves for cupping proper and ironing, as illustrated in Fig. 5. The two partial force-stroke curves are separated by a stroke interval which depends upon the spacing of the two dies in tandem. If this spacing is smaller than a certain value, the metal will enter the bottom (ironing) die while it is still in the process of cupping, Fig. 3. Consequently, the two respective force-stroke curves will be superimposed, the extent of overlapping depending upon the spacing, and also upon the design of the top (cupping) die. Contour of the cupping die may be such as to form the greater part of the cup either in its upper or in its lower portion, and the maximum force may be correspondingly reached either early or late in the cupping procedure. Contour of the cupping die is also of paramount influence on the magnitude of the maximum cupping force.

However, most commercial cupping is performed with a single die, and the cupping proper and ironing may then occur practically simultaneously. General use of dies with a taper in their lower part, Fig. 4b, can be considered as an attempt to separate the ironing from the cupping proper. Consequently, such a die can be considered academically as a tandem die with zero spacing. The force-stroke curve for such a die may or may not illustrate the two partial operations, Fig. 6, depending upon the contour of the die and the punch diameter, which determine the extent of superposition of the two partial operations.

Breaking Conditions — Respective breaking conditions for cupping proper and ironing also can be expected to be different. In cupping, the maximum



strain may be the shear in the circumferential
tion of the blank on which the punch corners act.
may be the tension developed parallel to the sur
and radial in respect to the initial blank by the pu
against the bending and folding resistance of
metal resting on the die corners, whichever of the
comes closer to the respective strengths of the m
Investigations on thin sheet have shown that a
sion failure usually occurs on cupping if the pu
diameter is less than about 45 per cent of the b
diameter, providing tools have a suitable contour

Ironing of a cup is, on the contrary, a drawing p
ess of the same type as the drawing of tubing
a mandrel or rod. Theoretically, a maximum reduc
in cross-sectional area of approximately 65 per
can be expected. This high value is caused by
fact that the friction between cup and punch tr
fers force and consequently relieves the metal f
some tension. Such high values of drawability
to 70 per cent and more, have been confirmed in
perimentation on tubing and cartridge case draw
both for brass and for steel.

On commercial cupping the force-stroke curve
have either one or two maxima, depending upon
extent of overlapping of the two processes. Als
the case of two maxima, either the first or the se
maximum may be the larger depending upon
respective reductions in diameter and in wall th
ness. If the reduction in diameter is large and
reduction in thickness is small, the first maxi
will be the larger and vice versa. Other factors w
offset this relation are again the design of the
and also the flow characteristics of the metal.

Maximum Values of Force—As the maximum va
of force govern the size of the press, particul
when hydraulic equipment is to be used, the effe
various factors on the maximum drawing forces
measured for a few conditions. The ironing for
determined primarily by the magnitude of the re

TABLE I
DIMENSIONS OF BLANKS USED

Blanking Die Dia. Inches	Blanking Punch Dia. Inches	Total Clearance % of Thickness
0.935	0.905	20
0.935	0.933	1
0.950	0.905	31
0.950	0.933	12
0.975	0.905	48
0.975	0.933	29
1.000	0.933	46
1.000	0.960	28
1.000	0.970	20
1.050	0.970	55
1.100	0.998	70
1.100	1.042	40

(A) CUPPING DIES AVAILABLE FOR INVESTIGATION

Diameter Inch	Half-Die Angle Degrees
0.655	Various
0.670	Various
0.685	Various
0.705	7
0.720	7
0.720	9
0.740	9
0.740	12
0.760	7
0.780	7
0.800	7
0.820	7
0.766	Cylindrical (various radii)

TABLE II
(B) CUPPING DIES DESIGNED FOR INVESTIGATIO

Desig-nation	Land Dia. Inch	Die Opening Dia. In.	Half-Die Angle Entrance	Half-Die Angle Middle
			Degrees	
A	0.720	0.975	30	20
B	0.720	0.975	25	15
B_1	0.720	1.000	25	15
B_2	0.720	1.000	25	15
C	0.720	0.975	20	..
D	0.720	0.975	30	20
E	0.720	0.975	50	25
F	0.720	1.000	25	15
G	0.720	1.000	25	15
H	0.720	1.000	25	15

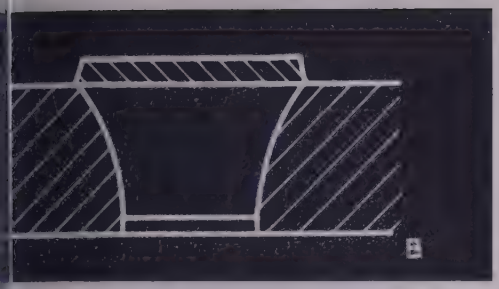


Fig. 4—Types of cupping die contours

on in cross-sectional area, while the die contour has t slight effect. Consequently, it should be expected hat if cupping is associated with very heavy ironing, he maximum cupping force should be high if cupping d ironing take place simultaneously, as when cy- drical dies are used. It should be low if the iron- g is separated from the cupping proper, such as oc- rs in tandem die cupping.

With small reduction in wall thickness, the die ntour may be decisive regarding the maximum for pping. Thus the maximum for such cupping in- eased considerably with decreasing radius at the e opening of a cylindrical die. The available tapered s did not permit a clear comparison because of the riations in their die contour and dimensions, the ects of which cannot be readily evaluated.

Highest cupping forces observed were below an per limit which can be represented as follow:

$$P = (R_1 + R_2/2) \times A \times S_u$$

ere $A = \pi \times D \times t$, D = diameter of the blank, = thickness of the blank, S_u = 60,000 psi = ulti- te strength of the steel, R_1 = reduction in di- eter, R_2 = reduction in wall thickness.

For a die which separates the greater part of the ll reduction from the cupping, the maximum cup- g force may be represented approximately by the llowing equations: $P_{max.} = R_1 \times A \times S$ or $P_{max.} = R_2/2 \times A \times S$, whichever of the two is larger.

In cupping steel the cupping proper appears to be deciding factor regarding the maximum for the ater part of the range of possible reductions. On ping brass, however, the first maximum has been nd to surpass the second only if the wall reduc- n is small, that is, lower than 20 per cent for the ected die. This is explained by the fact, known m experimentation on thin walled metal, that the ximum force in cupping usually is reached in the t part of the stroke corresponding to small re- tions. As brass possesses a very low yield strength the soft condition, the cupping force should be in comparison with the ironing force. This iron- force is determined by the resistance of the metal jected to the full range of reductions, starting h the metal previously hardened by cupping.

Regarding the effect of die design on the shape of force-stroke curve and on the maximum force particular, a desired reduction in maximum force y be accomplished either by spacing the cupping per from the ironing and/or by selecting a die tour which results in minimum values of both mponents, other factors being constant.

(To be concluded)

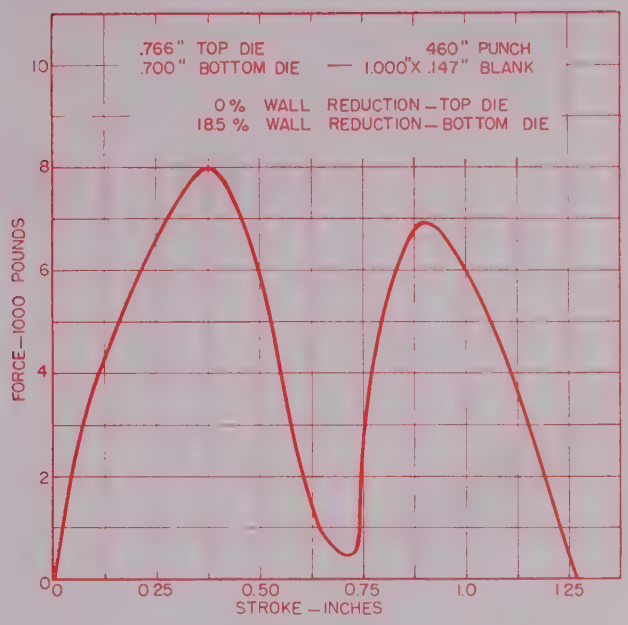


Fig. 5—Force-stroke curve for tandem die arrangement with no ironing in top die

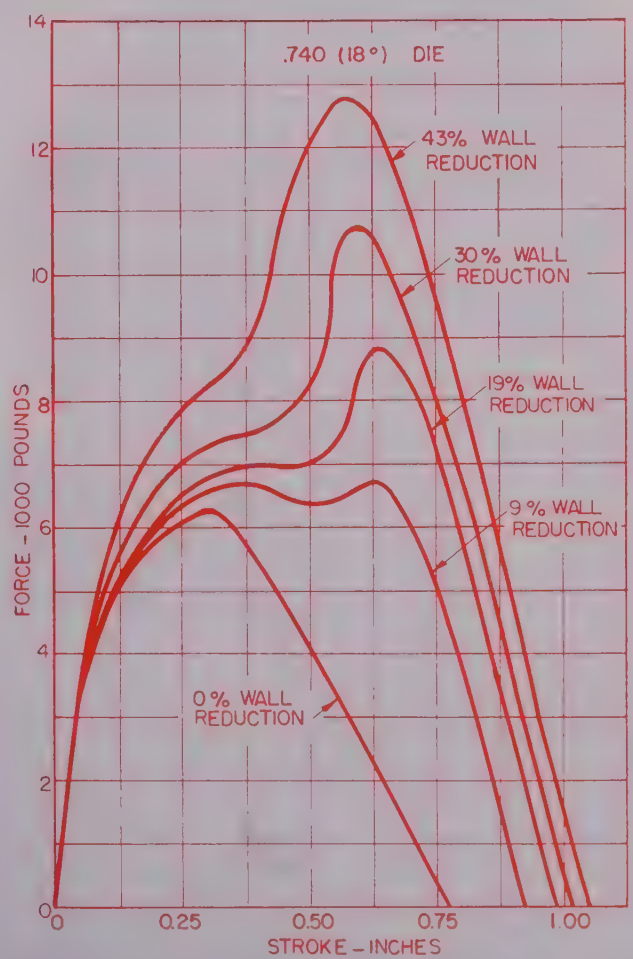


Fig. 6—Effect of various reductions in wall thickness on the force-stroke curve when cupping with single die

Centrifugal and Vacuum

INVESTMENT CASTING

. . . used to produce intricate, close-tolerance pa from difficult-to-cast alloys

By E. F. ROSS
Chicago Engineering Editor, STEEL

EXPANDING acceptance of the investment casting process for production of small close-tolerance metal parts in intricate shapes, and from alloys which because of their extreme hardness or melting characteristics are not amenable to conventional metho of fabrication, continues to promote research aim at improving casting techniques.

Casting by the investment method is not new. Bas on the lost-wax process, it has been used many yea in the dental and jewelry fields. The procedu achieved industrial prominence during the war wh it was adapted to production of blades and other pa for turbines and superchargers from heat-resisti alloys machinable only with greatest difficulty, a

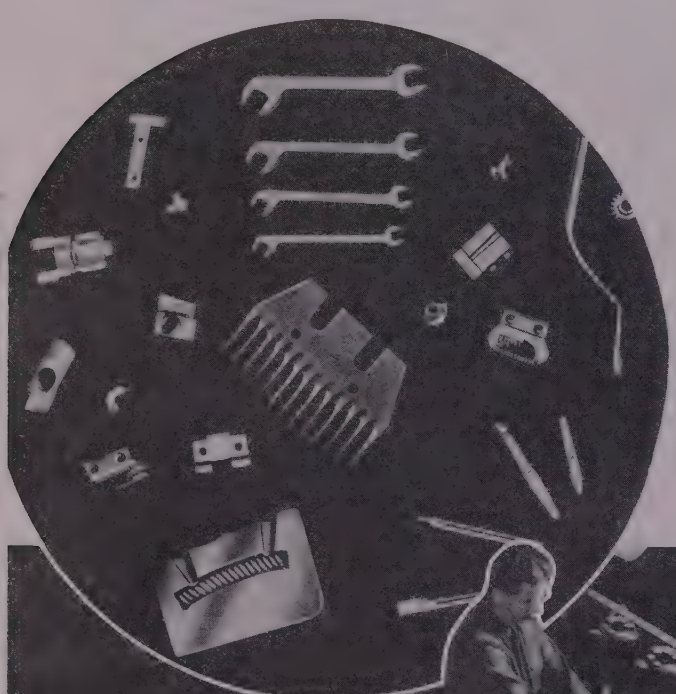
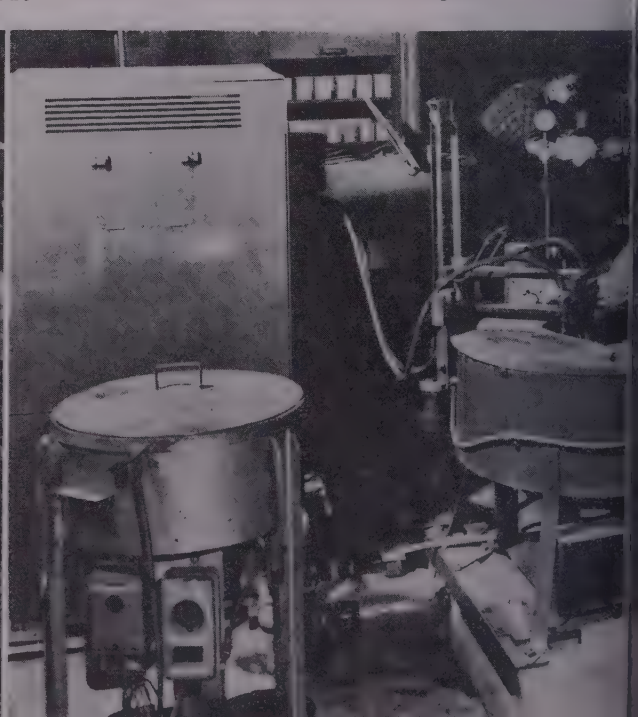


Fig. 1 (left)—Centrifugal and vacuum investment casting is adaptable to small parts of intricate design requiring high strength

Fig. 2 (below left)—Patterns of polystyrene plastic are assembled into clusters by attaching gates and a sprue. Mixing mold investment is shown at upper right

Fig. 3 (below)—Shown here are two of the three centrifugal casting machines and high frequency induction melting equipment. Flasks in the electric oven for mold drying are shown in center background. Furnaces for burning out the plastic from the molds are at right



small precision gun parts requiring extreme wear istance. Experience thus gained has been used ce the end of the war to take full advantage of the cess in the manufacture of peacetime products.

recent entry in the investment casting field is ctronicast Inc., Chicago. Organized in July, 1948, company devoted the better part of a year to erimental work and perfection of procedures. Its ilities include equipment for induction melting and trifugal or vacuum casting of carbon steels, low high alloy steels, stainless steels, tool steels, cial alloys, beryllium copper, brass, aluminum ys and manganese bronze.

ome of the parts the company produces are shown Fig. 1. These include ignition wrenches, sewing chine parts, stapling machine parts, inserts for stic injection molding dies, inserts for permanent ds, radio components, gun parts, photoengravers' ting bits, draftmen's pens, gage parts, universal its and similar items.

lastic Patterns—While some use is made of wax terns, bulk of production is through utilization of ystyrene plastic patterns. These patterns are embled into cluster formations as shown in Fig. 2, using heat to attach the individual patterns to stic gates and a plaster sprue button. After the terns are thus aggregated, the cluster is sealed a hard rubber base.

Next the plastic patterns are dipped in a fine slurry silica sand to give precoat strength, and allowed air dry for about 15 minutes. A stainless steel k, either cylindrical or square, is placed over the ter and the secondary investment of commercial a is poured in. After the investment material has dified, but prior to curing, the rubber base is oved.

ig. 4 (below, left)—Clusters of castings shaken rom molds are given a smooth machine-like finish by a fine and blasting operation

ig. 5 (below, right)—Finished parts are removed rom gates and sprues with high-speed cutoff wheels

Molds are cured by placing the flasks in an electric drying oven where they remain for about 16 hours at a temperature ranging from 150 to 200° F. From this oven, shown in the background of Fig. 3, the flasks are transferred to one of five batch-type gas-fired furnaces, standing in line to the right of the drying oven. Temperature is raised slowly in these furnaces. At approximately 750° F, the plastic patterns are burned out and following this the flasks are brought up to a red heat, usually 1600 to 1800° F. Maintaining the flasks in an oxidizing atmosphere for about 2 hours results in elimination of all the plastic pattern residue and other volatile matter from the refractory mold material. Molds are now completely cured and are ready for the metal charge.

Filling Molds—The molds are filled with metal in one of three automatic horizontal centrifugal casting machines or on a vacuum casting setup of the company's own design. Choice of technique depends upon the parts being cast. The centrifugal casting machines, shown in Fig. 3, provide for induction heating of the metal; because of the close temperature control which can be maintained, they permit pouring to a most exacting degree.

Charges consist of small pieces of virgin metal carefully weighed out and placed in standard centrifugal casting crucibles made of ceramic fire clay or mullite. These crucibles, which average 2 pounds in weight, range from 2½ to 3½ inches diameter at the base and 5 to 6 inches diameter at the top. When a crucible is placed in the clamping fixture of the casting machines, a water-cooled copper coil is lowered over it. This is connected to one of two high-frequency induction heating machines equipped with automatic timing devices. One machine is 35 kva capacity, the other 16 kva. Current is turned on and the metal is melted at the rate of approximately 1 pound per minute.

When the metal is at the proper temperature—1200 to 2000° F in the case of (*Please turn to Page* 144)

Simultan

GRINDI

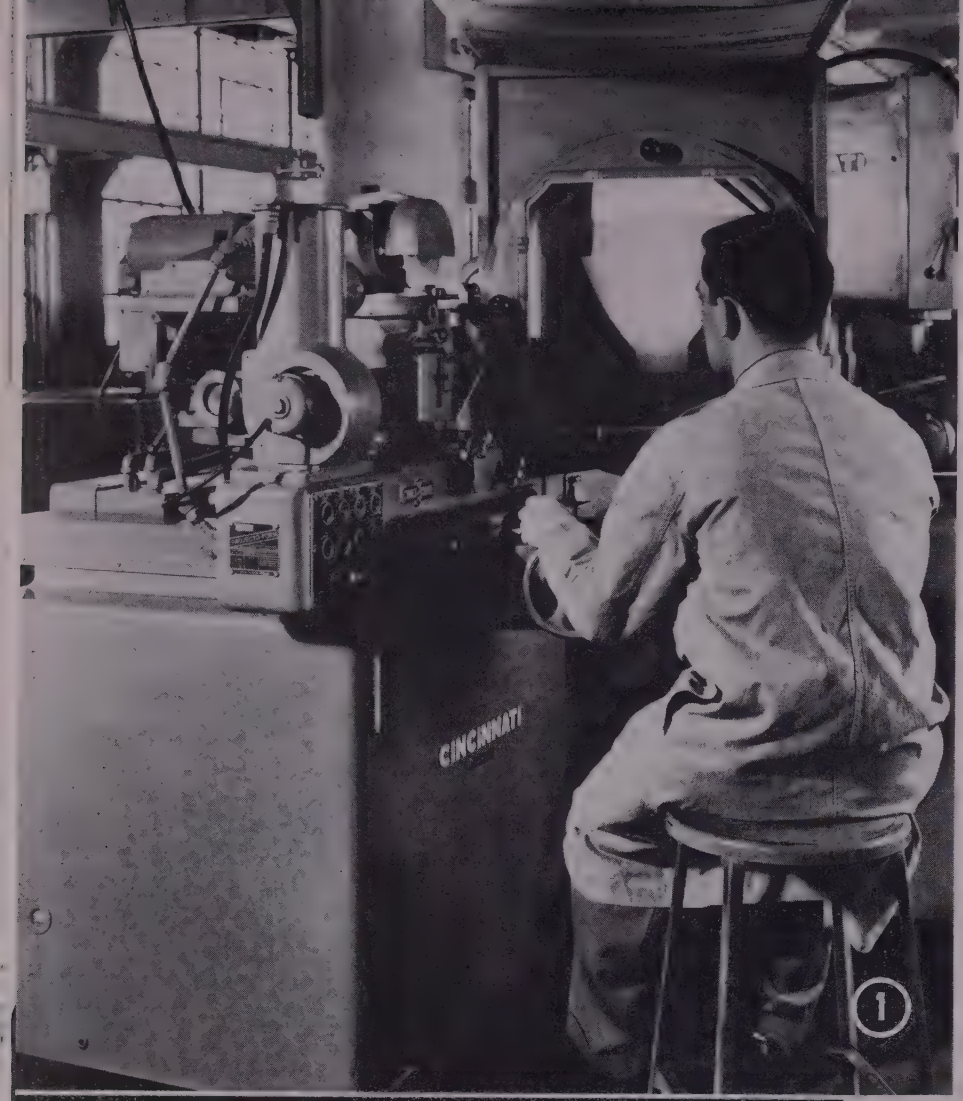


Fig. 1—Operations of grinding an checking are performed simultan eously on the Projecto-Form grind ing machine

Fig. 2—(left) This part is 1.247 inch long, largest diameter is 0.310 inch. Form tool was ground in 2½ hours. (center) Grinding time o this job was reduced by 60 pe cent. Large diameter 0.532-inch length 0.775-inch. (right) Grind ing time for this form tool wa reduced from 10 hours to 2½ hours by the new method. Part i 1.926-inch long, largest diamete is 0.248-inch

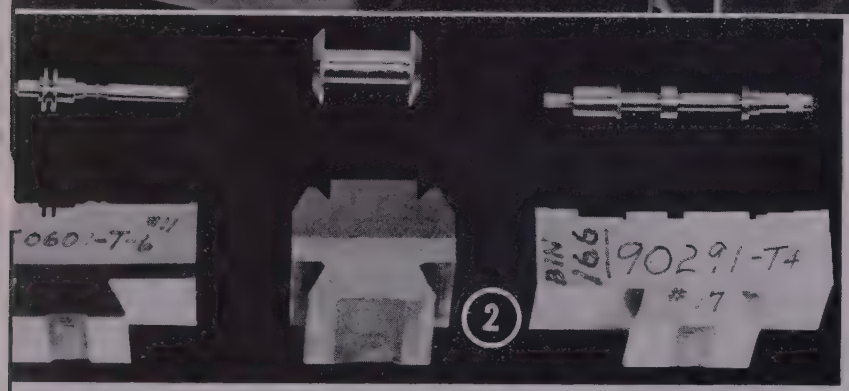
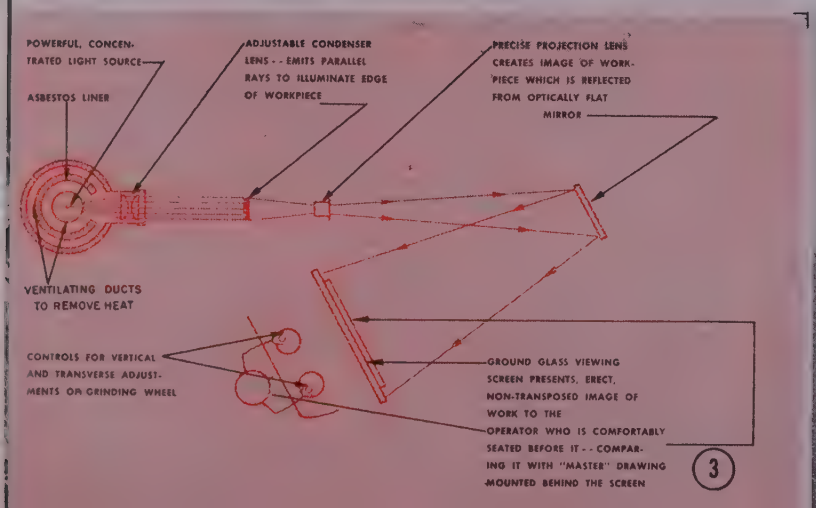


Fig. 3—Schematic drawing show ing optical projection system

Fig. 4—Layout scribing machin provides means of making maste drawings on a scale of 20 to 1 an accurate to 0.001-inch

Fig. 5—Entire contour of blankin punch for this part was groun by the new technique. Time wa reduced by 68 per cent

Fig. 6—Grinding time on this hard ened steel template was reduce by 72 per cent


POWERFUL, CONCENTRATED LIGHT SOURCE
ASBESTOS LINER
ADJUSTABLE CONDENSER LENS - - EMITS PARALLEL RAYS TO ILLUMINATE EDGE OF WORKPIECE
PRECISE PROJECTION LENS CREATES IMAGE OF WORKPIECE WHICH IS REFLECTED FROM OPTICALLY FLAT MIRROR
VENTILATING DUCTS TO REMOVE HEAT
CONTROLS FOR VERTICAL AND TRANSVERSE ADJUSTMENTS OF GRINDING WHEEL
GROUND GLASS VIEWING SCREEN PRESENTS, ERECT, NON-TRANSPOSED IMAGE OF WORK TO THE OPERATOR WHO IS COMFORTABLY SEATED BEFORE IT - - COMPARING IT WITH "MASTER" DRAWING MOUNTED BEHIND THE SCREEN
3

D CHECKING METHOD

. . . reduces over-all processing time on gages, form tools, small templates

Procedure devised by Cincinnati Milling Machine Co. not only gives a toolmaker complete control of vertical and transverse movements necessary to grind an accurate profile, but also supplies him with an optically enlarged view of the shape of the workpiece plus a master drawing made to the same ratio

ELIMINATE delays and reduce setup time when ıding small templates, gages, form tools and com- ent parts of stamping, piercing or forming dies, ew grinding method incorporates an optical pro- ion system in a grinding machine. With this pro- ıre, devised by Cincinnati Milling Machine Co., innati, only one setup is required because the rations of grinding and checking are combined performed simultaneously. Since an operation be carried through from start to finish without rruption, the over-all time required for the job onsiderably reduced. Time savings of 50 or 60 cent are not unusual. Time required to grind the tools illustrated in Fig. 2 illustrates this point. some jobs the saving in time is even greater.

toolmaker or diemaker, seated at a Projecto- n grinding machine as shown in Fig. 1, not only complete control of the vertical and transverse ements necessary to grind an accurate profile, has immediately in front of him an optically rged (20 to 1 ratio) view of the shape of the rkpiece plus a master drawing made to the same o. The workpiece and grinding wheel appear olid black objects on the viewing screen while desired shape of the work piece is outlined on master drawing by sharp bright lines. The operator actually sees an enlarged picture of the surface of the workpiece and can continue to remove stock from a surface until the edge of the black image of the workpiece splits the corresponding line on the master drawing. A schematic drawing of the optical system is shown in Fig. 3.

Advantages of being able to see an enlarged view of the workpiece while the grinding operation progresses, are obvious. This is particularly true of small workpieces like the punch for the part shown in Fig. 5. The line in solid color indicates that the entire contour was ground.

Variety of work in the average tool and die shop usually includes making templates of many sizes and descriptions. Grinding small templates is another class of work well suited to the method as illustrated by the fact that the grinding time for the hardened template shown in Fig. 6 was reduced by 72 per cent.

Lamination dies are usually built up of a number of identical sections. When grinding workpieces requiring rotation, such as crush dresser rolls or circular form tools, the circular grinding attachment is used on the machine.

Master drawings are made on the layout scribing machine, Fig. 4. A glass plate coated with a tinted translucent gelatin emulsion is used. Lines are scribed by a carbide tipped stylus which cuts through the gelatin emulsion leaving an accurate sharp line. Rigid slide-ways guide the scriber holder; accurate positioning to 0.001-inch is assured by graduated scales equipped with verniers. For scribing arcs a trammel bar of the beam compass type is provided. Also, a microscope with a cross-hair reticule may be interchanged with the scriber in order to relocate over a line or to position over a center point.

Since the scribed lines are only 0.004-inch wide, the thickness of a line on the master drawing represents only 0.0002-inch on the workpiece as seen on the viewing screen of the grinder. It will be seen, therefore, that it is easy to reproduce the desired profile on a workpiece within close limits.

Wiremakers Exchange Ideas on

CARBIDE DIE PRACTICE

Important operating data presented before a highly coordinated meeting in Chicago covered application of back pull in wire drawing, results that materialize by increasing bundle sizes, facts to be recognized in processing stainless steel wire and other shop practices

INTEREST in the 20th annual meeting of the Wire Association, LaSalle Hotel, Chicago, October 17-21, gained momentum from the opening session until the final research paper was presented. Over 400 were registered.

Next year's convention will be held at the Lord Baltimore Hotel, Baltimore, during the week of October 16. Regional meetings for 1950 are being planned for Chicago, San Francisco and Toronto.

At a symposium on tungsten carbide dies, which was one of the highlights of the convention, the following facts were brought out. The degree of polish on the die depends upon each mill practice. As rods go through the die, there is a tendency for the rod to turn slightly on its axis and thus produce a polish on the die that simply cannot be established by a machine. A 14 or 16-degree approach angle affords good production on high and low-carbon wire and at the same time eliminates the problem of stocking dies. Common practice in the United States is to run dies with no bearing.

Die-Life Increased—In copper practice it has been found that as the bearing of the die increases in length, the pull on the wire also increases. As the bearing and pull increase, the wire has a tendency to draw undersize. One operator pointed out that die life is decreased 60 per cent by using a 125 per cent bearing. Another wiremaker mentioned that at his mill maximum die life is obtained by using a 16-degree approach angle. Production tapers off when an 18-degree approach angle is employed and die life is exceptionally poor when a 20-degree angle is used. Consensus was to the effect that a 16-degree angle on a carbide die is the ideal angle under copper wire drawing practice.

Wide discussion centered around a paper entitled "Back Pull Wire Drawing" by D. Lewis and H. J. Godfrey, chief and assistant chief engineer, development engineering, respectively, John A. Roebling's Sons Co., Trenton, N. J. The paper described the experience of the company with a Marshall Richards back pull machine.

From a mechanical point of view the machine has a number of unique features:

1. Wire passes directly through die from block.
2. Block pull is adjustable to any required torque and after adjustment remains in constant ratio with the torque of the other blocks at all speeds.
3. Any draft from zero per cent up may be used on any block.

Split Torsions Reduced — The authors found that an increase in back pull on the machine reduced the percentage of split torsions. They presented charts to show that the temperature with high back pull was 30° F lower than with low back pull.

When drawing low-carbon steel wire without back pull, the amount of drafting per hole is limited by the breakage which occurs when the draft is too high. It was brought out that the draft may be within the range of 30 to 40 per cent without undue breakage.

When back pull is used the forward pull is increased causing breakage unless the draft is suitably restricted. Tests show that the maximum safe drafting with back pull is about 30 per cent per hole.

Discussion of this paper brought out diversified views concerning the advantages of this method of wire drawing. Some were of the opinion that the promise of back pull drawing has not been substantiated; others maintain that the method can be used for special purposes only. A few wiremakers felt that since the machine still was in its infancy, that more time should be allowed for additional operation before passing judgment on its performance.

Today there is no such thing as a humble day laborer and the hourly rate being paid makes ever handling conscious. This was bro out by J. W. Galloway, plant neer, B. Greening Wire Co., Hamilton, Ont., in discussing of Bundles in Handling Wire Wire Products."

Grouped Machines Advocated we could double the size of present package to and from the drawing machine, he stated, per one operator could run twice number of units. Mechanical hand equipment is available to do the required. The author advoc grouping the rod and interme machines together for by so d the operator is paid on the f mediates only. Thus the wire not need to be weighed between two operations. Overhead handli such that the wire, as stripped rod frames, can be taken direc the pay-off stands back of the termediates and loaded onto ready for welding. These pa stands have the wire loaded on back end where it can be welde the bundle already there, wit stopping the machine.

R. S. Brown, Rylands Brot Ltd., Warrington, England, in sp ing on "Plastic Strain and Hy esis in Drawn Steel Wire" menti that wire as-drawn possesses no tic properties and therefore ha elastic limit. The speaker sh the unique ability of drawn wir withstand the repeated applicati combined bending and tensile str is due to its capacity for plastic associated with hysteresis beha of a high order. Wires of high-te strength produced by hardening tempering were shown to po negligible creep characteristics greatly reduced hysteresis and speaker warned that such wires proved to be unsuitable for use u conditions involving dynamic stre

Mr. Brown asserted that si ageing and accelerated ageing heating to a low temperature stores the elastic range almost pletely.

Investigations indicate that plastic and hysteresis properties essential for a durable rope wir as these properties are impaire rise in temperature of the wire d drawing, future progress of th must be along the line of con suppression of temperature ri the wire immediately as it l the drawing die.

In rolling chromium nickel from billets to rods, a gen higher temperature is emp

(*Please turn to Page* 146)

MESTA forgings

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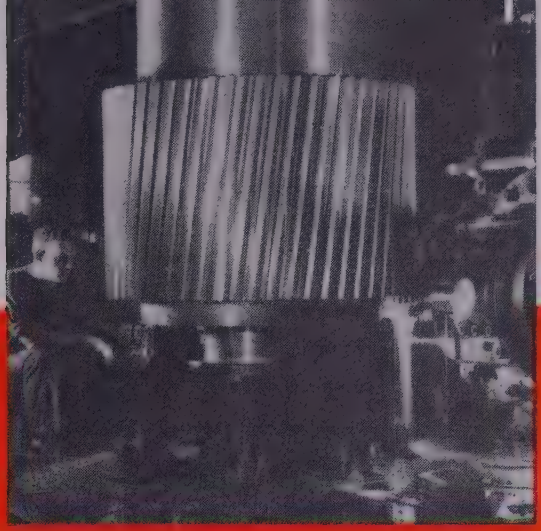
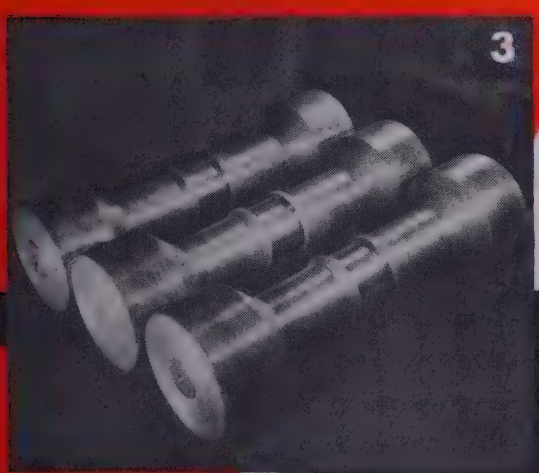
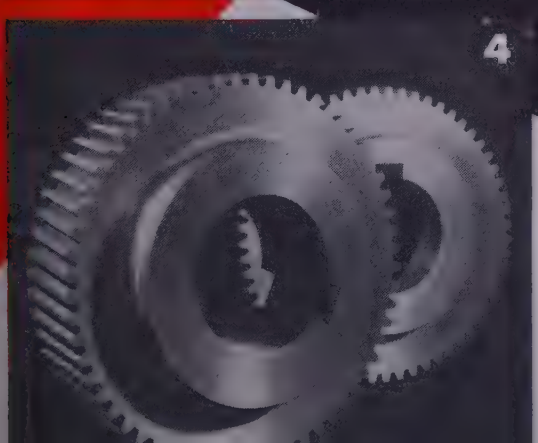






1 Forged steel single helical cut tooth pinion for vertical edging aluminum rolling mill.

2 Group of forged steel coupling halves.

3 Group of semifinished forged steel spindles for four-high continuous strip mill.

4 Forged steel gears for four-high skin pass mill feed reel.

MESTA MACHINE CO.
PITTSBURGH, PA.

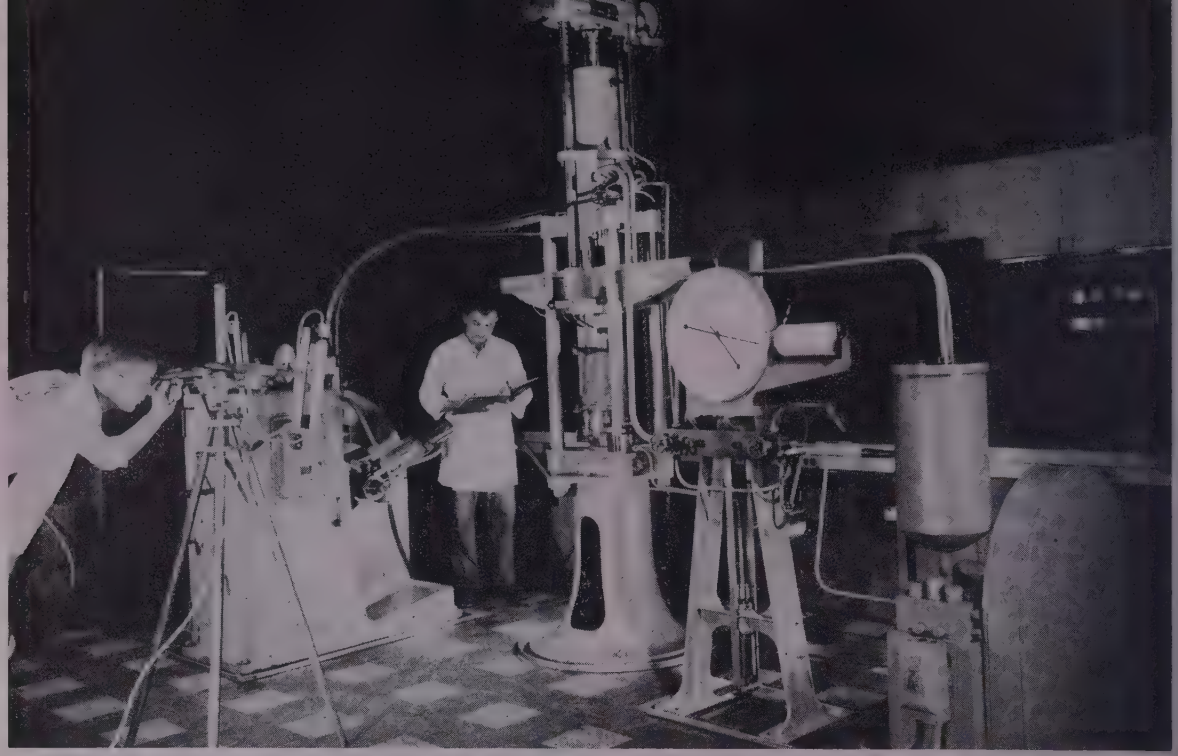
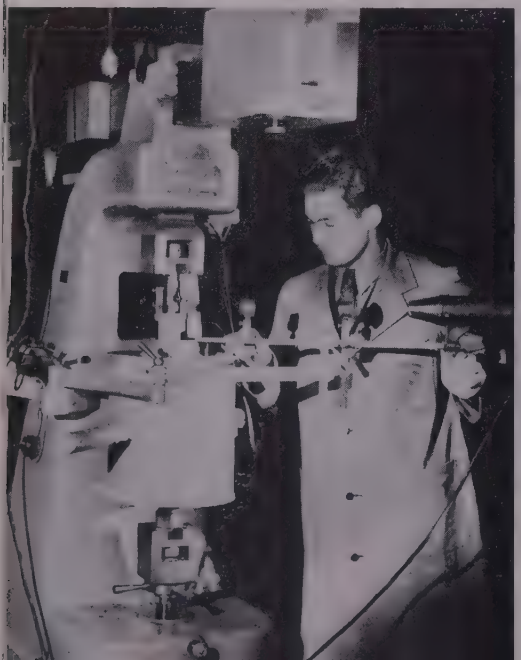


Fig. 1—Tensile properties of steel valves are determined with aid of this 72,000 pound capacity testing machine of Swiss design. Unit is equipped with an electric specimen heating furnace

New Laboratory Concentrates on

STEEL VALVE RESEARCH

NEWLY opened laboratory at the East Chicago, Ind., plant of Edward Valves Inc., which builds steel valves from ⅛ to 14-inch pipe size for power generation, petroleum and other industries, is believed to be the only one of its kind equipped exclusively for steel valve research. Besides facilities to determine characteristics of various cast or forged steel valves for elevated pressures and temperatures as high as 1800° F, or extremely low subzero temperatures, it includes equipment to guide development of new designs adapted to increasingly severe service conditions.



Basis of selecting materials for steel valves revolves around the strength of the materials at both high and low temperatures, and the structural stability of steels used. Strength is influenced by service temperature in operation—and stability of steel structure produced by welding used in fabrication. For this work, the laboratory makes use of many specialized units to obtain data on tensile, fatigue, impact, hardness and stress properties.

To obtain tensile properties of steels, technicians here emplo testing machine of 72,000 p capacity equipped with an ele specimen furnace. Elongation measured by a mirror extenso so increments as small as 0.0 inch can be detected at both and elevated temperatures. Im strengths are measured in an im tester of 120 foot-pound capaci

Fig. 2—Strength of valves at high temperatures is measured by conventional testing machines and also by creep and stress-to-rupture tests as shown here

Impact Tests—High tempera impact tests are conducted by ing bars separately in electric fle furnaces. For subzero tests bars are precooled in an autom ally controlled liquid bath coole introducing liquid nitrogen. ranging from minus 300° F to 1200° F are considered common. though fatigue strengths of m ials are checked in rotating machines, fatigue tests of full parts are made in a pulsation fa tester equipped with a pulsat 40,000 pound capacity. In a hours, valve parts such as disks and stems can be subject repeated loading—equivalent to years of hard usage.

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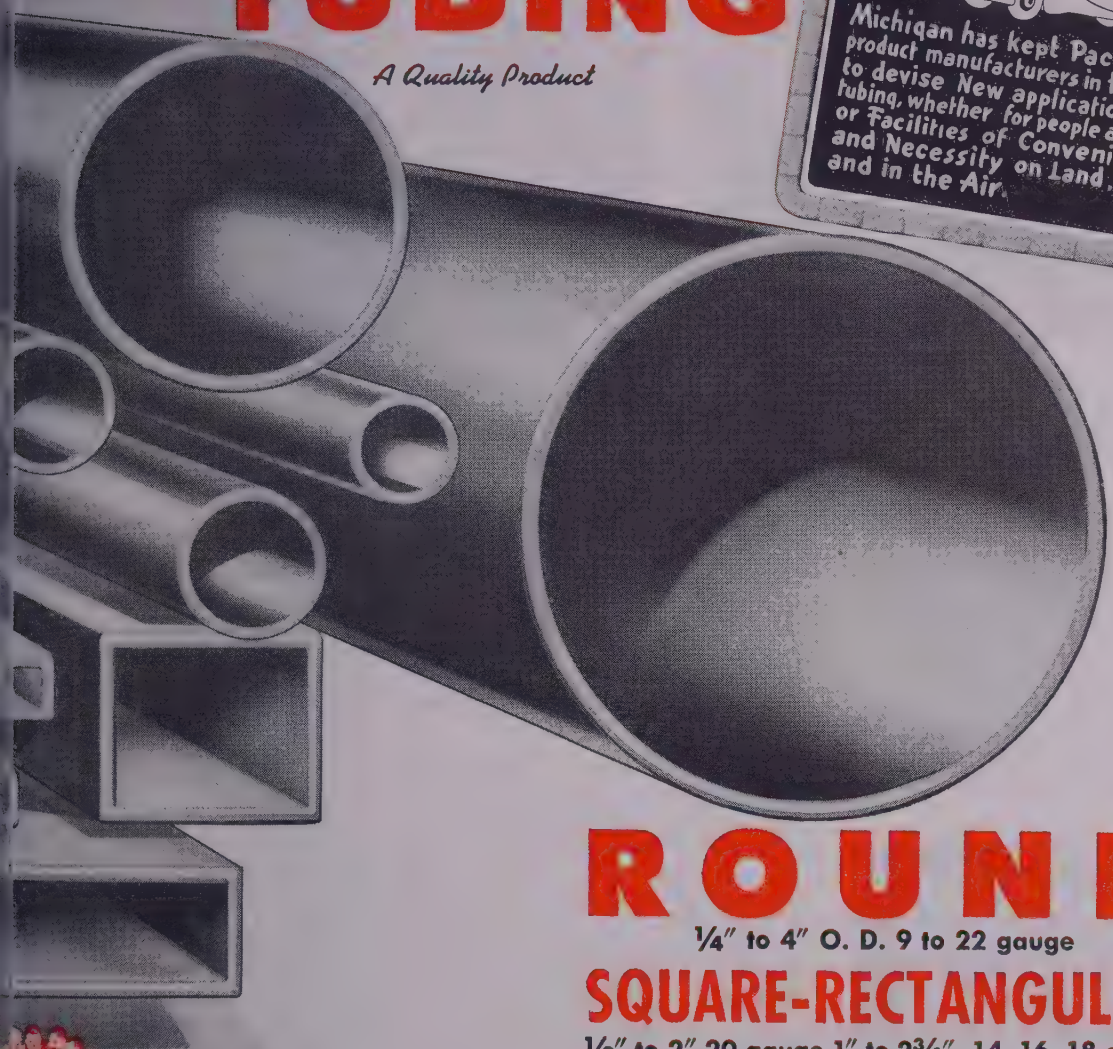

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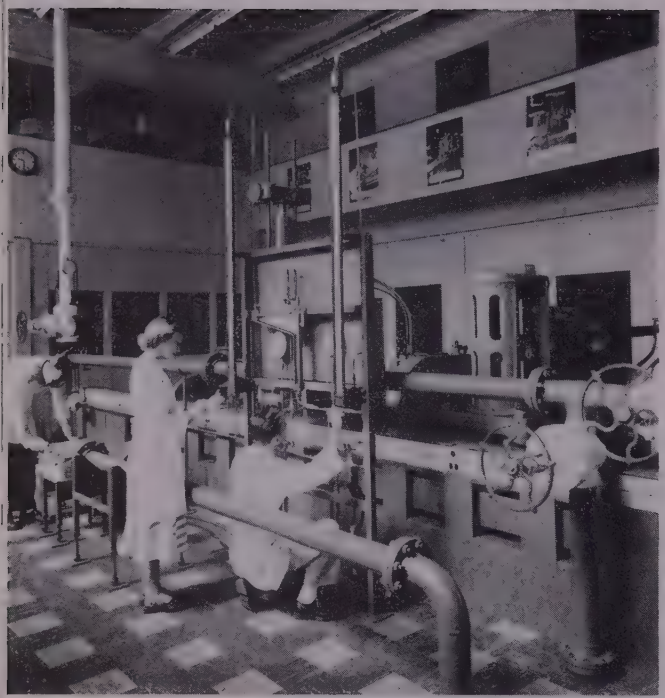

Fig. 3—This flow test stand designed by the company enables valves to be tested with 4000 cubic feet of air at 100 pounds per square inch. It is equipped with orifice meter for measuring quantity of flow and station for measuring pressure drop of valves

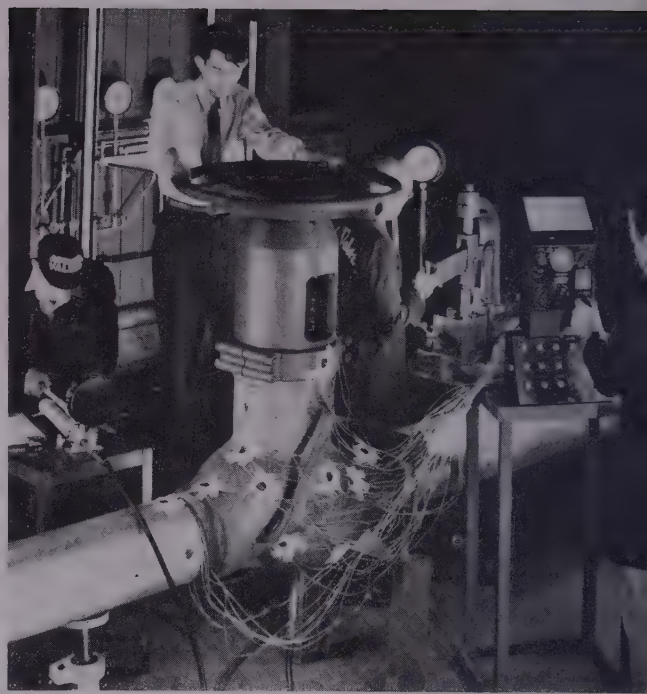

Fig. 4—In making stress analyses of valve parts both Stresscoat brittle lacquer and Baldwin Southwark SR-4 strain gage methods are used. As shown a multiple-point strain gage balancing unit, employed with the latter, facilitates measuring strains at a large number of points

ers employed in the laboratory is an Alpha Brinell unit of Swedish manufacture. This is used as the standard of hardness measurement on larger parts, and is provided with a furnace for making tests at elevated temperatures. An attachment employed with a metallurgical microscope facilitates hardness testing of individual grains of steel in studying structural components. Variety of other testers—Monotron, scleroscope, portable Brinell and Vickers units—enables technicians to check easily various valve materials regardless of size.

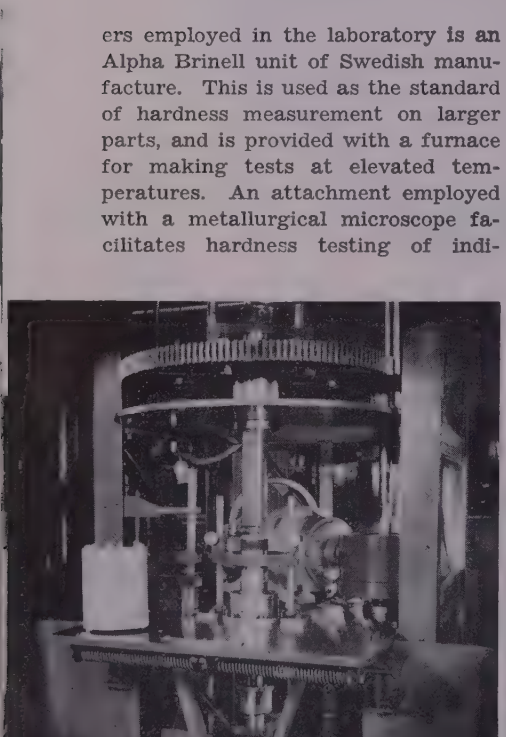

Fig. 5—Valve stem thread tester which operates up and down continuously

Strength at elevated temperature is measured not only with short time tests in a conventional tensile machine but also by creep and stress to rupture tests under constant load and high temperatures. One creep detecting machine, imported from Germany, records photographically the plastic deformation of the steel test bars as accurately as 1 micro inch.

Tests All Type Valves—Requirements of product design and testing lead to quite a number of more specialized machines developed particularly for valve use. For example, a flow stand designed and constructed by the company enables 4000 cubic feet of air at 100 pounds per square inch to be used for valve testing. Valves handled can either be full size units as large as 12 inches or plastic models which are varied readily to investigate effects of changed shapes or designs.

To obtain stress data for tur out suitable steel valves for pressure-high temperature use, laboratory makes use of both Stresscoat brittle lacquer and B win-Southwark SR-4 strain methods. With the latter, a mult point strain gage balancing uni employed so strains at a large n ber of points may be measured a single load of the test valve. Va also are stressed up to yielding by a pressure test at various peratures. This is done by ei hand-operated high-pressure pu or a special motor driven air int fying unit. Assembly and opera stresses are duplicated by to wrenches or application of wire sistance strain gages to actual l ing members. Bending movem associated with pipe line installat are achieved by hydraulic jack power-operated hoists.

Study Thermal Gradients—As terpretation of the effect of stre in steel valves is tied up very in ately with an accurate knowledg the temperature distribution w each valve and its parts during u the temperature of the fluid pa a valve in use has only an ind effect on the temperature of operating handwheel. Thus a s

(*Please turn to Page* 150)

PHYSICS OF POWDER METALLURGY

. . . discussed at symposium

CENT advances in solid-state sics were correlated with engi- ring approaches to problems in der metallurgy at a recent 2- symposium sponsored by the allurgical laboratories of Sylvania ctric Products Inc., Bayside, N. Y. ding American and European au- rities gathered for the first time er commercial auspices to pro- te a better understanding of the hanisms of sintering. Theories mechanisms of sintering, self- usion, viscous flow, grain growth, leation, recrystallization and sur- e tension were among the subjects ussed in the 23 papers presented. joint paper by Walter E. Kings- manager, Sylvania Metallurgical oratories and chairman of the posium, and G. F. Huettig, head he department of inorganic chem- y, University of Graz, Austria, noted the meeting with the obser- ion that pure research into basic nomena is a valuable aid to under- ding the mechanism of sintering the relation of the fabrication ess to the properties of sintered erials. This paper, which sur- ed the various phases of research powder metallurgy, discussed a modynamic approach, methods of m transport, kinetics of sintering, the present state of the theory of ering. The various stages of sin- ng were outlined, and emphasis ed on the signficance of changes he compact occurring before den- ation.

eometric adjustments were cited explain these changes, in which contact area between particles reases from a point contact as the surface area decreases. The ly of surface energetics was wn to be a significant contribu- to the understanding of the ering process. It was also pointed that although there is still a rgence of opinion on some of theoretical aspects of powder allurgy, developments in recent rs have served to provide a foun- on for basic concepts.

rystal Growth—Since the theory sintering is concerned with the hanisms of grain behavior, the ers on crystal growth, recrystalli- zation, nucleation, and grain boundary movements sustained considerable interest. A new technique of studying crystal growth was described by A. Smekal, head of the department of physics of the University of Darmstadt, Germany, who used crystals of rock salt as a model in his experiments. Since the growth of ionic crystals can be directly observed under microscopic examination and new planes actually seen as they appear, NaCl crystals provide a convenient model for crystallographic studies of surface effects, rates of growth, and self-diffusion.

Two distinct mechanisms of crystal growth were observed: (a) At low temperatures, growth was bounded by cube planes, but (b) at high temperatures there was no connection with crystallographic planes. The latter mechanism is the same as that occurring in metal crystals where the rate of growth is governed by the supply of the material. Smekal also showed how self-diffusion was studied by means of electrical conductivity measurements and how these data were related to migration and "freezing" of holes in the crystal lattice.

A striking group of color photographs illustrating recrystallization and grain growth was presented by P. Beck of the University of Notre Dame. The observed directions of boundary migration were discussed, and it was shown that grain growth is related to the orientation of nuclei. The relationship of grain orientation to diffusion at a given grain boundary was discussed in a paper by R. Smoluchowski and M. R. Achter of Carnegie Institute of Technology. Data were presented on grain boundary diffusion of silver in copper. Rates of homogeneous nucleation and the effects of impurities and of the container wall were described in a paper by J. H. Hollomon and D. Turnbull of General Electric Co. Considerations of changes in physical properties with recrystallization were presented by M. Balicki of Polytechnic Institute of Brooklyn.

Properties of Metals — Although most sintering processes are accomplished at temperatures near the melting points of the metals used, most of the detailed studies of the properties of metals are performed at much lower temperatures. A paper by B. H. Alexander and G. C. Kuczynski of Sylvania Electric Products Inc. described an investigation of the characteristics of metals at high temperatures, under conditions of stress and dispersion that prevail during sintering. Possible types of flow mechanism which could lead to bonding of metallic particles were discussed, and it was shown from experimental results that volume diffusion flow is effective in bringing about a bond between copper particles up to 1070° C. In creep experiments on gold wire at 1050° C, the flow was found to be viscous at stresses lower than the critical value. At higher stresses the flow first occurred by slipping, but became viscous at longer times.

New techniques in the use of radioactive tracers in self-diffusion studies were described in a paper by M. Cohen, D. Bakalar, and F. S. Buffington, of Massachusetts Institute of Technology. They presented data on the self-diffusion rates in alpha and gamma iron. The diffusion process in the sintering of copper-gold compacts was discussed in a paper by Pol Duwez and C. B. Jordan. Sintering of $AuCu_3$ was discussed in relation to the solubility of copper in the ordered and disordered phases of AuCu at the lower temperatures of the sintering process.

Rate of Plastic Flow—A quantitative discussion of the laws by which surface tension and geometry determine the rates of plastic flow, evaporation and condensation, volume diffusion, and surface migration, was presented by Conyers Herring of Bell Telephone Laboratories. In the absence of externally applied stresses, the changes in shape of the welding together of small particles of a pure crystalline substance were assumed to be motivated by surface tension and effected by one or more of the above four processes. Methods were derived for computing volume diffusion currents by potential theory and for calculating the effect of grain boun-

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FLAME FABRICATING

Structural Steel

Straightening, forming and cleaning operations on heavy and complicated sections are greatly facilitated by correct utilization of oxyacetylene equipment

By F. H. DILL
Welding Engineer
American Bridge Co.
Ambridge, Pa.

SINCE the introduction of the oxyacetylene cutting torch and its companion, the welding torch, to the structural fabricating industry over 40 years ago, there has been ever increasing use of the oxyacetylene flame to perform old tasks more easily and to accomplish work beyond the reach of other tools. Local heating of parts for mechanical straightening or hot bending is a use that developed because it could save time.

Straightening complicated pieces and assemblies solely by local heating, and the corollary process of forming or cambering steel parts by local heating, save time and cost, and accomplish results that could not be attained otherwise without large and costly machinery.

An early and still important use of the oxyacetylene flame in structural work is for heating steel to visible red heat so it can be straightened with hammer blows. This permits parts, such as connection angles and light flanges that stand out from large members and are often bent in handling, to be straightened without moving the piece to a machine. It saves both time and expense. A similar application appears in the final setting to accurate dimensions of pieces that have been bent in presses.

Local Heating—A more recent use of the oxyacetylene flame is for locally heating steel to hot bending temperatures preparatory to bending in a press or by other mechanical means. This application, which is possible where there is a plentiful supply of low cost acetylene, pits the rapid heating of the oxyacetylene flame against the slower more soaking heat of less expensive fuels burned in torches or in open top, slot-type furnaces. Heating time is reduced, sharper bending and more accurate location of bends can be attained. Heating time is reduced directly by rapid heating rate of the intense oxyacetylene flame, but there is further saving of time and fuel because a short heating time minimizes the loss of heat into contiguous metal that it is not necessary to heat.

Sharper bending and more accurate location of bends result from the ability to heat only the metal which must be deformed in bending. It is very important when using the oxyacetylene flame to heat sufficient metal to permit bending without excessive reduction in the thickness and width of the piece being bent. For unsymmetrical sections this demands heating of triangular or trapezoidal shaped areas.

Another very important precaution is to avoid heating to temperatures of 400 to 700° F any steel that has been severely cold-worked, as by cold-forming, punching, or shearing. Inattention to this precaution can allow the development of strain-aging and consequent brittle fracture of the steel. An example of this can be cited from the records of a large fabricating shop in the fracture of several 8 x 8 x 1⅛-inch flange angles for girders. The angles were punched and then curved by cold-forming before they were torch-heated for making a sharp angular bend. They broke in brittle manner through punched holes about a foot from the center of the bend while they were being fitted and assembled with the web and other parts of the girders.

Straightening and Forming—Wide acceptance of flame-cutting and welding as practical methods for fabricating structures has provided great impetus to the use of the oxyacetylene flame for straightening a forming steel. When rivets are us for connecting the elements of structure there is seldom need straightening or fairing complet members or assemblies. Flame-cu ting and welding, however, both volve intense local heating of t steel and inherently cause shrinka of the metal. It is natural to fig fire with fire and the intense ox acetylene flame has come into use creating balancing shrinkages th produce straight members and f structures.

During the wartime constructi of ships the fairing or flattening plating by local heating receiv much attention. Checkerboard p terns of spots and zebra-like stri were common sights in the sh yards. They displayed the shipbui ers' solution to the problem of eli inating the buckles that formed rectangular panels of thin plati that had been shrunk at the bou aries of the panel by the weldi which attached the plating to skeleton of the ship. Heating sp about an inch in diameter to visi red heat on a checkerboard patt in the buckled panels created an cumulation of small shrinka which, in total, equalled the w shrinkage around the borders of panel and drew it flat. Some sh yards preferred lines of heat to ro of spots and some yards used bo Often the cooling of the heated me was accelerated by directing sm jets of water or air-water spra against it to speed the work and increase the shrinkage of each sp In all of the work, however, the m using the torch had to judge "temper" of the buckle and skillfu fit the amount and location of he ing and accelerated cooling to the dividual conditions of each panel.

Fabricating Large Structures—the fabrication of large structu and structural members by weldi there are often detail or overall tortions from the dimensions that completed pieces are required have. The pieces are usually bulky to fit into presses for corr tion of their dimensions and many them are beyond the reach or pacity of mechanical methods straightening. Experience indica that heating to produce shrinka along lines parallel to and opposite the welds permits the necessary

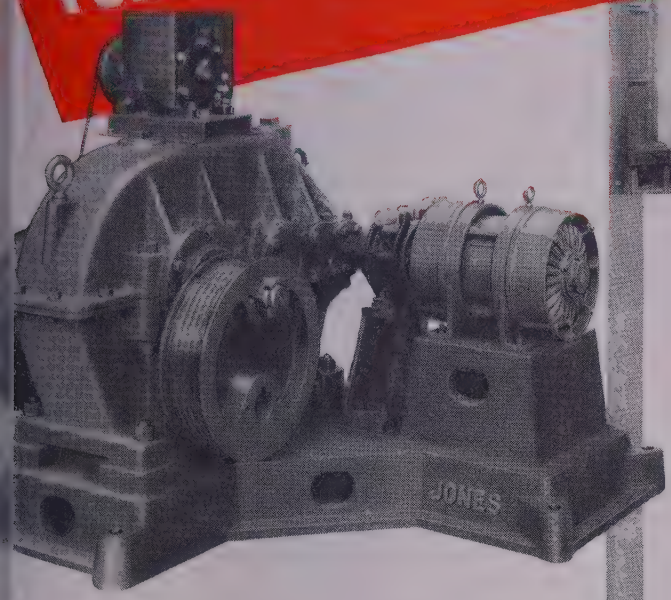
(*Please turn to Page* 160)

Specifications that define flame-cleaning as a unique process involving the following four separate operations were adopted by the American Institute of Steel Construction so the process can be distinguished from descaling processes and can be held to accomplishment of its intended results in commercial use:

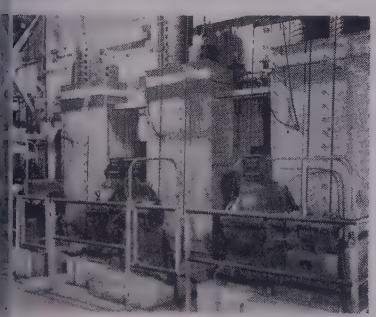
1. Oil, grease and similar materials are to be removed with solvents.
2. Surfaces of steel are to be cleaned and dehydrated by the passage of the special oxyacetylene flames. (This operation drives absorbed moisture from the surfaces and also breaks away partly loosened mill scale and rust.)
3. Surfaces are to be wire-brushed and then swept with soft brushes to remove loosened scale, dirt and dust.
4. Paint is to be applied promptly and while the temperature of the steel is still above that of the surrounding atmosphere.

From data presented by the author before the 1949 annual meeting, International Acetylene Association, Pittsburgh.

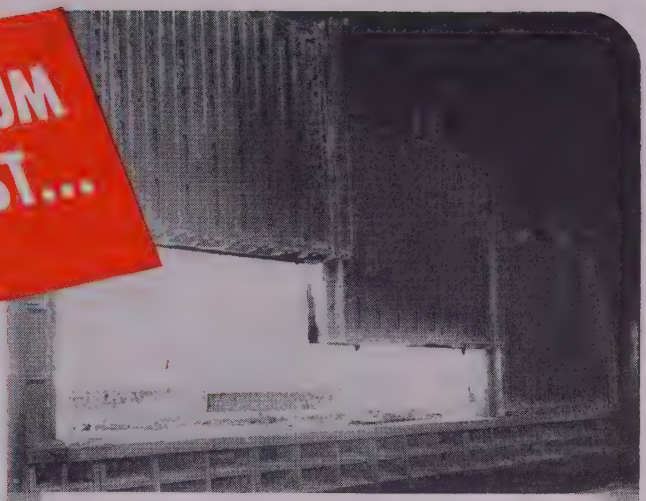
JONES ECCENTRIC DRUM FURNACE DOOR HOIST...



JONES ECCENTRIC DRUM FURNACE DOOR HOIST showing the two eccentric winding drums mounted on opposite ends of the low speed shaft. Opening and closing take place on the short radius of the eccentric so minimum motor torque is required for starting. Furthermore there is practically zero impact when the door starts to open and when finally closing, as a protection to the refractory material. Electric brake is located between the motor and hoist and the limit switch is located on top of hoist. Speed reduction is through the Jones triple herringbone reducer unit.



Rear view of the furnace showing three of the six Jones eccentric drum type furnace hoists and the door counter weights.



THE JONES ECCENTRIC DRUM FURNACE DOOR HOIST shown was developed when it was found necessary to eliminate all interior door jambs on the **AMSLER MORTON CORPORATION** recuperative plate mill furnace. The large plate mill ingots required wide doors and **FRAZIER-SIMPLEX, INC.** "Tilt-Lift" all-door furnace front walls were selected for this purpose. Since each furnace, of the installation illustrated here, has six consecutive doors and no front wall and each door weighs 8500 lbs. (counter weighted about 6600 lbs.), it can easily be appreciated that the door hoist came in for the most careful engineering study. Three consecutive doors on each side of the divided furnace provide an opening 21 ft. long in each furnace.

THE JONES ECCENTRIC DRUM TYPE HOISTS, developed to solve this door opening problem, have now been in operation several years and have provided the excellent service that has come to be taken for granted by the users of Jones transmission products.

Door hoists of this, and other types, are built by Jones as complete units with motor included, if desired, or with a base to take standard motor as supplied by purchaser.

If you have a door handling problem, the Jones engineering department will be pleased to make a recommendation covering a unit for it.

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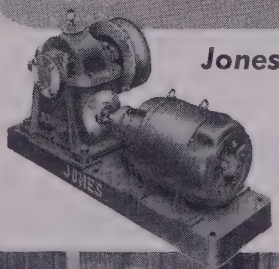
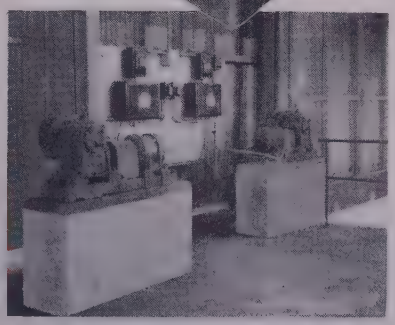


Jones "Slipper type" Hoists for small furnace or mill building doors.

This Jones door hoist is built in several ratings and in almost any convenient arrangement of sheaves and cables. No limit switches of any kind are required with this unit. A bronze ring on the winding drum slips to take care of overwinding.



The two Jones door hoists shown at the left are installed for opening and closing mill building doors.

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By B. H. DeLONG
Vice President and Technical Director
Carpenter Steel Co.
Reading, Pa.

Production of STAINLESS STEEL

The author continues his discussion of stainless steels presenting information regarding types and causes of corrosion encountered in service. These steels are broken down into three groups and presented in tabular form for quick reference

PART II

TO COMBAT the numerous acids and other corroding media, an economical choice must be made from the expensive noble metals, gold, platinum, silver, etc., and the more common metals such as tin, lead, stainless steel and iron. Each of these meet the requirements of physical and corrosion properties to serve in certain definite applications.

Degree of corrosion which can be tolerated may be roughly divided in three classes: 1—Conditions in which color, taste or odor of the final product is of most importance as encountered in the food, beverage, dairy, pure chemical and other industries; and the metals used must be corrosion resistant to the highest degree. 2—Parts for display or ornamental purposes, where surface appearance of the finished part is of most importance and freedom from discoloration is vital. This will, in most cases, involve the use of metals with a lesser degree of corrosion resistance than indicated in the previous class. 3—Parts used in industry, which must remain physically intact over an economized period of service operation, and in which the rate of corrosion and the life of the assembly are of most interest. This obviously allows, in some cases, the use of metals with a lesser degree of corrosion resistance than classes 1 or 2 above. Stainless steel, in its many ramifications of alloy content which impart varying degrees of rosion resistance and physical properties, has pr to be an engineering tool that meets the wide va of corrosion outlined above.

Some types of corrosion which may be encount in the use of stainless steels are: Intergranular rosion, galvanic corrosion, atmospheric corrosion, ting, and stress corrosion. The aspects of these t and precautions for avoiding their occurrence will be described.

Intergranular corrosion of stainless steels is fined solely to the nonmagnetic chrome-nickel t (304, 309S, 310, 316, 317)—see Table I. Briefly, is caused by a transformation of the austenitic st ture at the grain boundaries when the alloys heated to temperatures between 800 to 1500°F, or slowly cooled from higher temperatures through range. Under these conditions, the transformed g boundary areas are subject to attack under some ditions of moderate or severe service. For exam in the processes of welding there is a "transfor tion zone" in proximity to the weld. This are more subject to attack from intergranular corro than either the weld metal itself or the balance of assembly.

Such difficulty can be avoided by two procedu 1—By giving the welded assembly a heat treatm

Fig. 9—Intergranular corrosion of type 304 austen itic chrome-nickel stainless steel as emphasize by the copper sulphate test. Specimen on left wa properly annealed by water quenching from 200 degrees F and shows no cracking when bent. Midd specimen shows effect of test on piece anneale properly but then held for one hour at 1100 d grees F. Note cracks which developed on bendin Specimen at right was heated for one hour at 120 degrees F and is still worse

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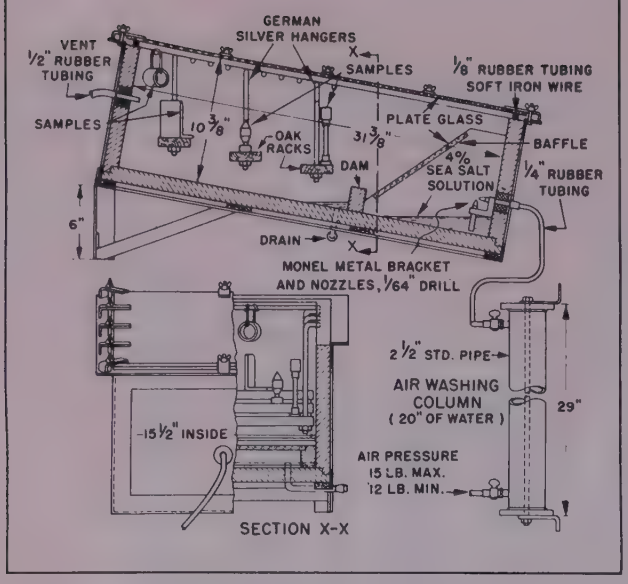


Fig. 10—Salt spray apparatus for testing resistance of stainless steels to rusting in 4 per cent sea salt. Specimens are left in this corrosive fog for 100 hours more or less

after welding. This treatment consists of annealing as described, in order to cool rapidly through the temperature range of 1500 to 800°F, depending upon the exact composition of the alloy. 2—By using chrome-nickel stainless steels that contain columbium or titanium. The columbium content is approximately ten times the carbon content and the titanium usually five times the carbon content. For continuous service in the temperature range of 800 to 1500°F, these "stabilized steels" are recommended.

To test for susceptibility to intergranular corrosion the copper sulphate or Strauss tests are commonly used. In this test the specimen, generally in the form of strip, is sensitized by welding, or artifically by heating to 900 to 1300°F, generally 1250°F, and then immersing in cupric sulphate for seventy-two hours. (3 or 10 per cent copper sulphate plus 10 per cent sulphuric acid.) The specimen is then bent 180 degrees around a pin whose diameter is equal to the thickness of the specimen as shown in Fig. 9. Some sensitized steels when submitted to this test actually granulate and fall apart; others lose their metallic ring when struck.

Galvanic corrosion is common to all metals. This is brought about when two dissimilar metals are in contact in a liquid capable of carrying an electric current. This includes practically all aqueous solutions. Under these conditions, an electric current is set up through the solution and tends to accelerate the corrosion of one of the metals and protect the other. For example, where both copper or copper alloys and stainless steel are in intimate contact in a solution of salt water, the current will tend to accelerate the attack upon the stainless steel portion and lessen the attack upon the copper alloys. In general, the corrosion resistance of stainless steel is lessened when in contact with lead, nickel, copper, copper alloys or graphite. On the other hand, it is improved at the expense of the other metal when in contact with iron, steel, aluminum, zinc or cadmium. The solution of this problem is using, so far as possible, metals of the same composition for complete assem-

blies when this condition is encountered. In so cases, however, it is possible to insulate the metals at the point of contact, and this procedur sometimes employed.

A related type of galvanic corrosion is the conc tration cell in which there are two different conc trations of electrolyte in contact with one metal.

As shown in Table I, stainless steels fall into groups, one designated "active" and the other "p sive". Under normal conditions stainless steels in the "passive state", and in this condition it is g erally assumed that a self-healing oxide film c tinually forms to prevent or retard corrosion. C sequently in this condition stainless steels beh very much like the noble metals. However, in c tain corrosive environments, notably in reducing ac and in the presence of the halides in acid soluti this protective film is destroyed as quickly as it for Under these conditions the alloys are described "active" and will behave in much the same man as iron or steel.

Under ordinary service conditions at normal t peratures, stainless steels are immune to atmosph corrosion. However, in polluted atmospheres—p ticularly in hot climates—corrosion is sometimes countered. Under these conditions, the most cor sion resistant of stainless steels should be employ Alloys containing chromium, nickel and molybden (types 316 or 317) are particularly recommended. atmospheres at elevated temperatures, scaling may encountered. Stainless steels have a much lower r of scale formation than ordinary steels. The deg of scaling at a given temperature depends upon exact composition of stainless steels employed composition of the atmosphere to which the meta exposed. In a general way, the higher the chromi content, the greater the degree of scale resistan It has been found by experience that repeated he ing and cooling cycles are much more damaging th continuous heating. In applying the chromium-nic stainless alloys (types 304, 309S, 310, 316 and 317) high temperature service, the problem of intergr ular corrosion described above should be taken i consideration.

Under certain conditions of service, stainless ste

TABLE I

Galvanic Series of Metals & Alloys

Corroded End (Anodic, or Least Noble)

Magnesium
Magnesium Alloys
Zinc
Aluminum
Cadmium
Steel or Iron
Cast Iron
Chromium-Iron (active)
18-8 Chromium-Nickel-Iron (active)
18-8-3 Chromium-Nickel-Molybdenum
Stainless No. 20 Alloy
Lead-Tin Solders
Lead
Tin
Nickel (active)
Brasses
Copper
Bronzes
Copper-Nickel Alloys
Silver Solder
Nickel (passive)
Chromium-Iron (passive)
18-8 Chromium-Nickel-Iron (passive)
18-8-3 Chromium-Nickel-Iron-Molybdenum (passive)
Stainless No. 20 Alloy
Silver
Graphite
Gold
Platinum

Protected end (Cathodic, or most noble)

ch are apparently immune to attack by certain so-ons will fail by corroding deeply in individual p s. This type of failure is known as "pit" corro-i . All the causes and correctives of this condition r not well understood at the present time. In gen-, the answer when this condition occurs would cate the selection of a stainless steel having a ter degree of corrosion resistance than that in ch the pitting has been encountered. Molybdenum ing grades, namely, 316 and 317 are less suscep-ible to pitting.

tress corrosion or "season cracking" is commonly ciated with the brasses, but is also frequently ountered in nonmagnetic chromium-nickel types stainless steel. In this type corrosion, the metal ks as though it were brittle and there may appear e no accompanying corrosion. In the case of brass, h phenomenon was demonstrated long ago by the king of cartridge cases after they had been stored y for some time. It has been ascertained that ure is due to internal stresses in the metal when osed to certain corrosive media. The stresses ch must be present may be imparted to the metal ing the forming operation, as when brass cart-ge cases are cold formed from a flat piece of brass; the stress may be in the metal while it is being embled such as when bent or carrying a load in vice. Obviously one of the best ways to minimize ss corrosion is to use fully annealed metal, and h, in the case of the nonmagnetic chromium-nickel ls, consists of fast cooling after heating to 1850 2100°F.

ome factors that influence corrosion, other than position of the metal and corrodent itself, are as ows: 1—The presence of impurities in the corro-ve medium. Some impurities act as inhibitors and w down the corrosion action. Other impurities as accelerators and increase the corrosion rate. smuch as pure chemicals or solutions are seldom countered in commercial work, the presence of even nor percentages of impurities is of most importance ld should be considered when using published cor-ion tables. 2—The temperature of the corrodent. a rule, the degree of corrosion increases with in-crease in temperature. There are numerous cases where metals satisfactory for cold solutions are entirely unsuitable for these same solutions at more elevated temperatures. 3—While in a general way corrosion rate will increase with increasing concentration of the corrodent, there are notable exceptions to this rule. For instance the behavior of certain stainless steels in sulphuric acid solutions is such that the corrosion rate increases but slowly up to a definite concentration, at which point the rate rises rapidly up to a maximum, and decreases with further increase in concentration. It is therefore not safe to interpolate corrosion data as related to solution concentration. 4—The degree of aeration to which a corrodent is exposed. Liquids kept in closed containers from which air or a circulation of air is excluded will cause different degrees of corrosion than these same liquids when freely exposed to atmosphere. This applies also to the presence of atmospheric gases which may sometimes change corrosive behavior of metals to a marked degree.

Corrosion resisting qualities of stainless steel are inherent in the analysis of the metal itself; however, contamination of the surface by adhering rust and scale will have a deleterious effect. For this reason, it is essentially necessary that all scale resulting from welding, or heating to elevated temperatures, be completely removed, and parts be kept clean while in service. A very high degree of purity and freedom from contamination is necessary in food handling and pure chemical industries.

There is at present no satisfactory method of forecasting accurately the behavior of stainless steels in a given set of corrosive conditions other than actual service tests. However, a very useful qualitative test for stainless steel or other materials is described in the proceedings of the American Society for Testing Materials, Vol. 33, 1933, page 178. As described, this applies only to tests for stainless steels in boiling 65 per cent nitric acid, but may be equally well applied to any other corrosive liquid. The test consists essentially of determining the loss in weight of a prepared specimen for each of five successive 48-hour

TABLE II

AISI CLASSIFICATION OF STAINLESS STEELS

Chemical Composition, per cent

ber	C	Mn Max.	Si Max.	P Max.	S Max.	Cr	Ni	Other Elements
	Over 0.08/0.20	2.00	1.00	0.040	0.030	16.00/18.00	6.00/8.00	.....
	Over 0.08/0.20	2.00	1.00	0.040	0.030	17.00/19.00	8.00/10.00	.....
B	Over 0.08/0.20	2.00	2.00/3.00	0.040	0.030	17.00/19.00	8.00/10.00	.....
	0.15 Max.	2.00	1.00	....	....	17.00/19.00	8.00/10.00	P,S,Se Min. 0.07 Zr, Mo Max. 0.60
	0.08 Max.	2.00	1.00	0.040	0.030	18.00/20.00	8.00/11.00	.....
	0.12 Max.	2.00	1.00	0.040	0.030	17.00/19.00	10.00/13.00	.....
	0.08 Max.	2.00	1.00	0.040	0.030	19.00/21.00	10.00/12.00	.....
	0.20 Max.	2.00	1.00	0.040	0.030	22.00/24.00	12.00/15.00	.....
	0.25 Max.	2.00	1.50	0.040	0.030	24.00/26.00	19.00/22.00	.....
	0.25 Max.	2.00	1.5/3.0	0.040	0.030	23.00/26.00	19.00/22.00	.....
	0.10 Max.	2.00	1.00	0.040	0.030	16.00/18.00	10.00/14.00	Mo 2.00/3.00
	0.10 Max.	2.00	1.00	0.040	0.030	18.00/20.00	11.00/14.00	Mo 3.00/4.00
	0.08 Max.	2.00	1.00	0.040	0.030	17.00/19.00	8.00/11.00	Ti 5xC min.
	0.08 Max.	2.00	1.00	0.040	0.030	17.00/19.00	9.00/12.00	Cb 10xC min.
	0.15 Max.	1.00	0.50	0.040	0.030	11.50/13.00	.....	Turbine Quality
	0.08 Max.	1.00	1.00	0.040	0.030	11.50/13.50	.....	Al 0.10/0.30
	0.15 Max.	1.00	1.00	0.040	0.030	11.50/13.50	.....	.....
	0.15 Max.	1.00	1.00	0.040	0.030	11.50/13.50	1.25/2.50	.....
	0.15 Max.	1.25	1.00	....	....	12.00/14.00	.....	P,S,Se Min. 0.07 Zr, Mo Max. 0.60
	Over 0.15	1.00	1.00	0.040	0.030	12.00/14.00	.....	.....
	0.12 Max.	1.00	1.00	0.040	0.030	14.00/18.00	.....	.....
F	0.12 Max.	1.25	1.00	....	....	14.00/18.00	.....	P,S,Se Min. 0.07 Zr, Mo Max. 0.60
	0.20 Max.	1.00	1.00	0.040	0.030	15.00/17.00	1.25/2.50	.....
A	0.60/0.75	1.00	1.00	0.040	0.030	16.00/18.00	.....	Mo 0.75 Max.
B	0.75/0.95	1.00	1.00	0.040	0.030	16.00/18.00	.....	Mo 0.75 Max.
C	0.95/1.20	1.00	1.00	0.040	0.030	16.00/18.00	.....	Mo 0.75 Max.
	0.35 Max.	1.50	1.00	0.040	0.030	23.00/27.00	.....	N_2 0.25 Max.

periods of immersion. In the case of exposure to boiling liquids, the test is carried out under reflux condensers. Loss in weight encountered by the metal under test is computed by a factor to inches penetration per month or mils per year. Consistent values which may be readily reproduced are obtained and these values will bear a general relation to the expected service life of fabricated equipment. However, it is often difficult to reproduce exact performance conditions in laboratory tests of this type, a absolutely accurate forecasts of equipment life co not be computed by this method. As a guide, S. Hoyt[1] has classified suitability to corrosion rate follows:

A. Fully resistant ..... less than 4 mils per
B. Satisfactorily resistant ..... 4 to 42 mils per
C. Fairly resistant ..... 42 to 120 mils per
D. Slightly resistant ..... 120 to 420 mils per
E. Not resistant ..... over 420 mils per

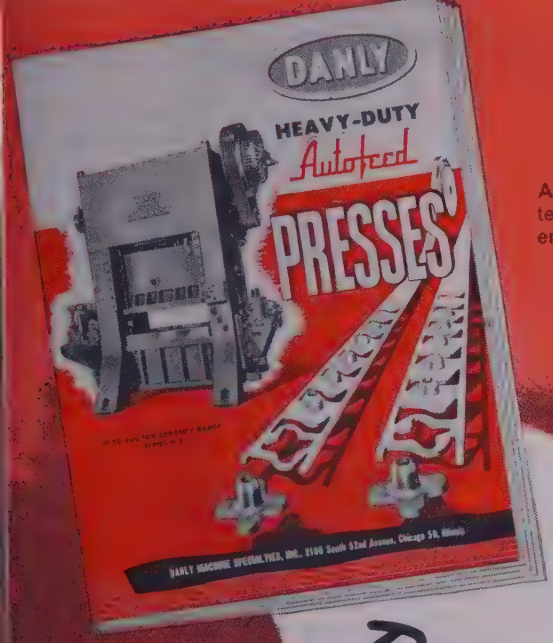
Another test used to evaluate stainless steels is "salt spray test". This test was originally desig

TABLE III

THE A-B-C OF CORROSION AND HEAT RESISTING STEELS

Arranged by F. R. Palmer, Carpenter Steel Co.

Group A (Martensitic) *Straight Chromium; Hardenable*	Group B (Ferritic) *Straight Chromium: Non-Hardenable*	Group C (Austenitic) *Chromium-Nickel; Non-Hardenable*
Chromium 11.50 to about 14%; carbon in balance up to about 0.40% (usually 0.15% or less); or chromium 16 to 18%, with carbon 0.60 to 1.20%. May contain nickel up to 2.50%, molybdenum up to 0.60%, and sulphur or selenium up to 0.40%. Magnetic.	**Chemical Analysis** Chromium from about 14 to 27%, with carbon up to 0.35% max. (usually 0.15% or less). May contain small percentages of copper, molybdenum and nitrogen. Magnetic.	Chromium-nickel combinations with chromium to 26% and nickel 6 to 22% with carbon fro about 0.05 up to 0.25% (usually less than 0.15% May also contain titanium, columbium, moly denum, sulphur or phosphorus and selenium. No magnetic.
Respond to hardening and tempering. Resulting physical properties also depend upon chemical analysis (principally carbon and chromium content). Brinell range: 140 to 600.	**Heat Treatment** Do not harden appreciably. For maximum toughness and good corrosion resistance should be annealed by cooling rapidly from about 1500° F. Brinell hardness 150 to 187.	Do not respond to hardening by heat treatmer but can be hardened by cold working to hi physical properties. For maximum softness a corrosion resistance, anneal by cooling rapid from 1850 to 2100° F. Brinell range 150 to 16 Can be work hardened to higher physical properties
Are structurally dependable after proper heat treatment; low carbon types (under .15% max.) not brittle in notched sections or under impact.	**Toughness** High bend toughness; notch toughness may be low (depending on composition and heat treatment). Overheating lowers toughness. Structure is refined and toughness increased by alloying with nitrogen.	Stabilized and very low carbon types are e tremely tough at all temperatures down to liqu air. Unaffected by notches. Exposure at temper tures between 900 to 1600° F may impair t toughness and corrosion resistance of nonstabiliz types.
Not subject to excessive grain growth. Grain structure may be refined by heat treatment.	**Grain Growth and Structural Changes at High Temperatures** The types low in carbon and high in chromium are subject to marked grain growth when heated for long periods at temperatures higher than 1800° F. Grain growth is retarded by the addition of nitrogen.	Alloys near the austenitic-martensitic borderli tend to precipitate carbides at grain boundari during service between 900 to 1600° F, losi some toughness and becoming susceptible to inte granular attack or corrosion. This can be co trolled by very low carbon or by addition titanium or columbium.
Thoroughly dependable for supporting any load or shock within their carrying capacity at working temperatures up to 1200° F. Strength much better than straight carbon steel for temperatures up to 1200° F.	**Strength at Elevated Temperatures** Creep strength about the same as Group A, but inferior to Group C. Load carrying properties are low at temperatures above 1300° F.	Alloys have high creep strength up to 120 F; creep strength is further improved by moly denum or columbium. Load carrying abili greater than Groups A and B.
May be forged, rolled (and in most cases pierced) at 2300° down to 2000° F. (Preheat and soak stock at about 1600° F.) The low carbon and free-machining types should be worked at higher temperatures; high carbon types at lower temperatures. Due to air hardening tendencies, slow cooling may be desirable.	**Hot Working Qualities** May be forged, rolled and in most cases pierced. To avoid grain growth should be heated quickly and not overheated or soaked. Forge from 2050° down to 1900° F. On last heat, forging may be continued down to 1500° F to refine grain. Alloys do not air harden.	May be forged, rolled and in most cases pierce Preheat and soak at 1600° F, then heat quick to about 2100 or 2300° F. Alloys do not a harden, and may be water quenched after h working.
Low carbon varieties in the annealed condition can be easily cold drawn into wire; bars and sheets can be cold rolled, formed, bent, upset, coined and deep drawn. Free-machining and high carbon types are more difficult to work. Alloys work harden about like carbon steels.	**Cold Working Qualities** Can be cold drawn into wire, cold rolled, bent, formed, upset, coined and deep drawn, especially when warm (300 to 500° F). The alloy with 17% chromium is especially suited for deep drawing and forming. Alloys work harden about like carbon steels.	Can be cold drawn into wire, cold worked, ben formed, upset, coined and deep drawn. T austenitic alloys work harden about twice rapidly as Groups A and B. May be cold draw or rolled to high tensile strengths.
Machine satisfactorily with properly designed tools and lubricants. The free-cutting types contain high sulphur or selenium and are very free-machining. Martensitic alloys are suitable for automatic screw machining.	**Machinability** Machining rates and tooling practices similar to Group A. The free-machining types contain high sulphur or selenium to improve machinability. Are suitable for automatic screw machining.	Most difficult to machine. Tools must be unde constant feed at all times; if feed is released, a lowing tools to ride the work, the surface wor hardens rapidly and it becomes very difficult t resume cutting. Addition of sulphur or seleniu greatly improves machinability.
Martensitic alloys make excellent rivets for driving cold. Air hardening, high chromium steels are not recommended for rivets driven above 1400° F.	**Riveting** Suitable for cold rivets. Hot riveting requires extra precautions to avoid brittle rivets. Rivets should be driven below 1400° F into chamfered holes.	Excellent for either hot or cold rivets. H rivets may be driven at any temperature abo 1700° F.
Can be welded with gas, electric arc, or by resistance. Preheating and annealing immediately after welding is generally desirable to prevent cracking. Little grain growth. Cracking will be minimized by using austenitic electrodes. Free-machining types not recommended for welding.	**Welding Properties** Can be welded with gas, electric arc, or by resistance. Anneal to reduce embrittlement alongside of weld. Use small electrodes and low currents to minimize grain growth. Free-machining types are not generally recommended for welding.	Well suited for all welding methods. Weld do not air harden and is very tough. Where corrosiv conditions are severe, use very low carbon or st bilized types (with Ti or Cb) of base metal an electrodes, unless the weld parts can be subs quently quenched. Free-machining types are n generally recommended for welding.
Increases with chromium content; inferior to Groups B and C. Resists weather, water, steam, and mild corrodents when chromium is 11.5% or more. If carbon is over 0.15%, must be hardened and tempered (below 800° F) for maximum corrosion resistance. Finished parts must be passivated.	**Corrosion Resistance** Possess corrosion resisting properties superior to Group A. Excellent for decorative trim except when exposed to marine atmospheres. Resists corrosion from many chemicals and food products. Especially good for nitric and other oxidizing acids.	Corrosion resistance generally better than Group A and B, especially in reducing organic acids. Re sistance to sulphite liquors and pitting attacks b chloride solutions markedly improved by addition of molybdenum. Resists industrial and marin atmospheres better than Groups A and B.
Scale resistance increases with chromium content. Alloys generally useful for continuous temperatures up to 1200° F, and in some atmospheres up to 1400° F.	**Scale Resistance** Superior to Group A. Resistant to destructive scaling up to 1500° F, rising with chromium content. Resistant to oxidizing and reducing gases.	Better than steels of equal chromium in Grou B.
403, 405, 410, 414, 416, 420, 420-F, 431, 440-A, 440-B, 440-C, 440-F.	**Type Numbers** 430, 430-F, 442, 443, 446.	301, 302, 302-B, 303, 304, 308, 309, 310, 31 321, 347.



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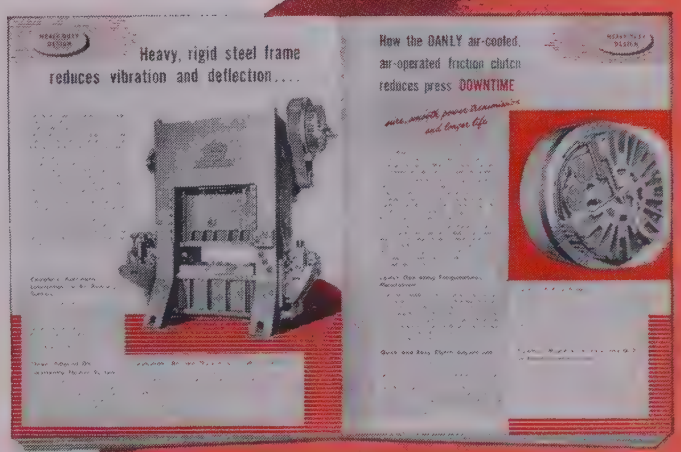
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Fig. 11—Typical electric arc furnace shop for melting stainless steel heats as seen from the casting pit

to test coatings on metals. The specimen is generally about 1 inch in diameter and pointed to resemble a plumb bob. This is subjected to a fog of salt water (4 per cent sea salt) for 100 hours in a closed box as shown in Fig. 10.

Practical experience with stainless steels during the past thirty years has shown certain analyses to be most useful. The selection has resulted in Table II prepared by the American Iron & Steel Institute. These steels have been arranged into three groups, A, B and C, by F. R. Palmer as shown in Table III. Steels in group A are characterized by their ability to be hardened by heat treatment to varying degrees and are magnetic. They are the simplest in analysis, containing 11.5 to 14 per cent chromium and up to 0.40 per cent carbon but usually less than 0.15 per cent carbon; or they may contain as much as 16 to 18 per cent chromium in which case the carbon is increased to 0.60 to 1.20 per cent. Steels in group A are generally hardened by heating to around 1800°F and quenching into oil; under the microscope it will then be noted that the structure is finely divided similar to the structure of a hardened tool steel. This structure is known as martensite.

Steels of group B are also of the straight chromium type and magnetic but unlike group A are nonhardenable by heat treatment. They contain from about 14 to 27 per cent chromium and usually have less than 0.15 per cent carbon. The group B steels are referred to as ferritic because they are found to be composed of grains similar to those found in pure iron.

Steels of group C are distinctly different—they are nonmagnetic, nonhardenable by heat treatment and contain nickel from 6 to 22 per cent in addition to 16 to 26 per cent chromium. This group of steels is referred to as austenitic.

As shown at the bottom of Table III certain AISI numbers fall into the A, B, and C groups. Straight chrome steels which make up groups A and B are all in the 400 AISI designation; whereas, chromium-nickel steels of group C are covered by the 300 AISI designation. Steels in each of the three groups in addition to the varying chromium, and carbon or nickel may also contain variable quantities of molybdeum, selenium, sulphur, columbium, titanium, etc. thereby accounting for the different type numbers.

PRODUCTION OF STAINLESS STEEL

In some respects the straight chromium 400 seri steels constituting groups A and B are similar a may be compared with the chromium-nickel steels group C as follows:

A—Steels of group A and B series are ferroma netic at room temperature whereas those of t group C are nonmagnetic.

B—The mean coefficient of expansion of the aust nitic stainless steels is, generally, about 50 per ce greater than those of ferritic type, as shown her

MEAN COEFFICIENT OF EXPANSION x 10^6 PER ° F.

Room Temp. ° F.	300 Series	400 Series
32° to 212°	9.6	5.5
32° to 600°	9.9	5.6
32° to 1000°	10.2	6.4
32° to 1200°	10.4	6.5

From Steel Products Manual, AISI, Sec. 24, May 1946.

The above represent average expansions of ea series but there are some variations within each serie For example, the high nickel alloys of the 300 serie namely, 25 per cent nickel—12 per cent chromiu (type 309) and 25 per cent nickel—20 per cent chr mium (type 310) have a slightly lower coefficie especially in the lower temperature ranges.

C—The modulus of elasticity of the chrome-nick stainless steels is approximately 28,000,000 poun per square inch. The 400 series steels, on the oth hand, run around 29,000,000 pounds per square inch These are to be compared with accepted value of 3 000,000 pounds per square inch for ordinary stee

D—Ordinary iron and alloy steel contract wh they change from the ferritic to the austenitic sta on heating, which means that the austenite is mo dense than the ferrite. This is also true when co paring austenitic with ferritic stainless steels. Chrom nickel steels, for example, have a density close to 0. pounds per cubic inch, whereas ferritic steels of t 400 series run around 0.28 pounds per cubic inch

E—Specific electrical resistivity at room temperatu for the chrome-nickel steels of group C runs arou 72 microhms per cubic centimeter as compared wi only 55 to 60 for the straight chrome in steels groups A and B.

F—Generally the thermal conductivity and the el trical conductivity vary in a similar manner. O would expect, therefore, that because of the low electrical conductivity of the chrome-nickel ste they would also have a lower thermal conductivit and this is true. The thermal conductivity of t chrome-nickel stainless steels is about 9.4 Btu p hour per square foot per foot per degree F. The fe ritic stainless steels run about 14.4. The therm conductivity of the austenitic stainless steels decreas slightly with increasing chromium.

G—The specific heat of the chrome-nickel steels ru around 0.12 Btu per pound per degree F (32-212° whereas the specific heat of ferritic alloys is slight lower, being 0.11.

H—Regarding color the 400 series steels have somewhat more bluish tint than the 300 series ste and tend to resemble chrome plate. The 300 seri steels are more yellowish.

(To be continued)

REFERENCES

1. Metals & Alloys Data Book, S. L. Hoyt, 1943.
2. Steel Products Manual, AISI, Sec. 24, May 1946.
3. ibid.
4. ibid.

AC or DC?

The Job Determines the Type of Welder

By Burke Porter, Chief Engineer
C. O. Porter Machinery Company, Grand Rapids, Michigan

Burke Porter

Extensive changeover of our woodworking machines from castings to weldments has made advisable the construction of a new plant devoted entirely to the fabrication of our machine parts. In equipping this new welding shop, we have given considerable thought to the types of arc welders to be installed.

ould they be AC or DC?

e advice of the local Lincoln Welding Engineer ed sound—*install both types of welders and use the hich is best suited to each job.*

cordingly, we installed three 400-amp. Lincoln DC ld-Arcs" and two 500-amp. Lincoln AC "Fleet-rs."

r the bulk of our work, DC is preferable. Much of it ves outside corner welds, all-position joints, inter-nt beads, light-gauge material, tubular members, we often weld stainless steel.

the other hand, in the welding of our bases, inside r joints and boxed-in areas result in considerable blow. Under these conditions, we can use higher rages and get faster welding and better quality the AC welders.

this problem of AC and DC welding, the unbiased mmendations of the Lincoln people are advantageous and our customers. It pays to apply the right type lding to match the job.

g 1. New weldment plant of the Porter Machinery Co., ence of the belief of this company in the superiority of welded steel for its products.

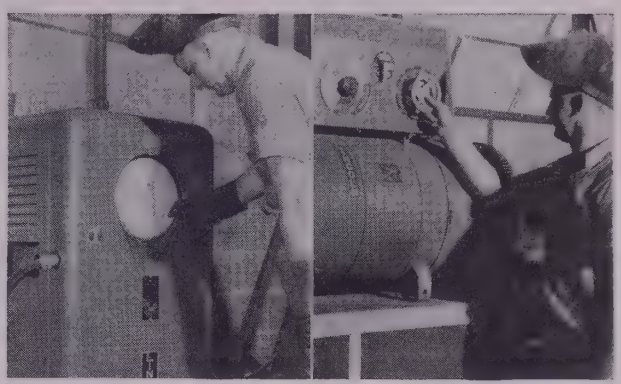

Fig 2. (Left) If arc blow is involved, the welder tackles the job with AC. (Right) If arc blow or very high currents are not involved, DC usually is best.

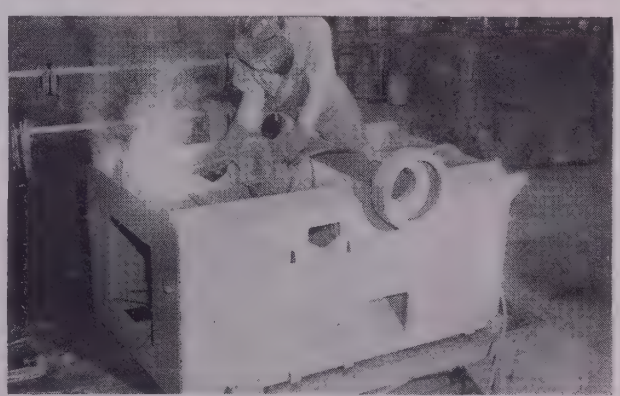

Fig. 3. Bases—where arc blow is severe—are welded with AC.

Fig. 4. Parts such as this frame are generally welded with DC.

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Aircraft Steels

(*Concluded from Page 111*)

no significant dimensional chan occur in the steel upon comple of the cycle, the steel tends to rest the complete shrinkage of the c mium layer and thereby increases tensile stresses in it.

If the chromium-plated steel heated to a sufficiently high temp ture (above 400° C), the contrac forces in the chromium produce ficient tensile stresses to cause pla flow or rupture of the chromi

COMPOSITION OF STEELS USED IN STU ING THE INFLUENCE OF CHROM PLATING ON THEIR FATIGUE LIMI

Element	SAE X4130 Steel Lot A	Lot B	Lot C
Carbon	0.35%	0.29%	0.33%
Manganese	0.53	0.47	0.55
Phosphorus	0.01	0.02	0.03
Sulphur	0.02	0.02	0.01
Silicon	0.21	0.25	0.24
Chromium	0.95	0.96	1.05
Molybdenum	0.19	0.24	0.20
Vanadium	*	*	*
Nickel	*	0.15	0.17

* Not determined.

plate thus relieving the residual t sile stresses in it. Thus, wh "tongued" tubes, Fig. 1, were hea above 400° C, the free ends of tongues were depressed below surfaces of the tubes, indicating release of the restraint in the st initially caused by residual ten stresses in the chromium. This s gests that the increased fatigue lim produced in the fatigue specim heated above 400° C were caused stress relief in the chromium pl accompanying its plastic flow or r ture.

Tests 12 Lubricants at Once

STUDYING of corrosion charact istics, oxidation stability and the v nish and sludge formation tendenc of lubricating oils is possible with improved apparatus which is ca ble of evaluating 12 samples at time. Called the Poly-Veriform brication tester, it was developed Precision Scientific Co., Chicago, co-operation with Standard Oil of Ohio. Instrument is easily clea in a short time.

Within the range of its operati are studies on the effect of expe mental variations in additive co position, the effect of additive c centration in a base oil, additive sponse in different types of base and the effect of corrosion inhibit in combination with corrosive det gent-type additives. The appara can also be used as a quality c trol instrument. It is a complete self-contained unit that can be tra ported to and operated in any p of a laboratory.

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Investment Casting

(*Concluded from Page* 117)

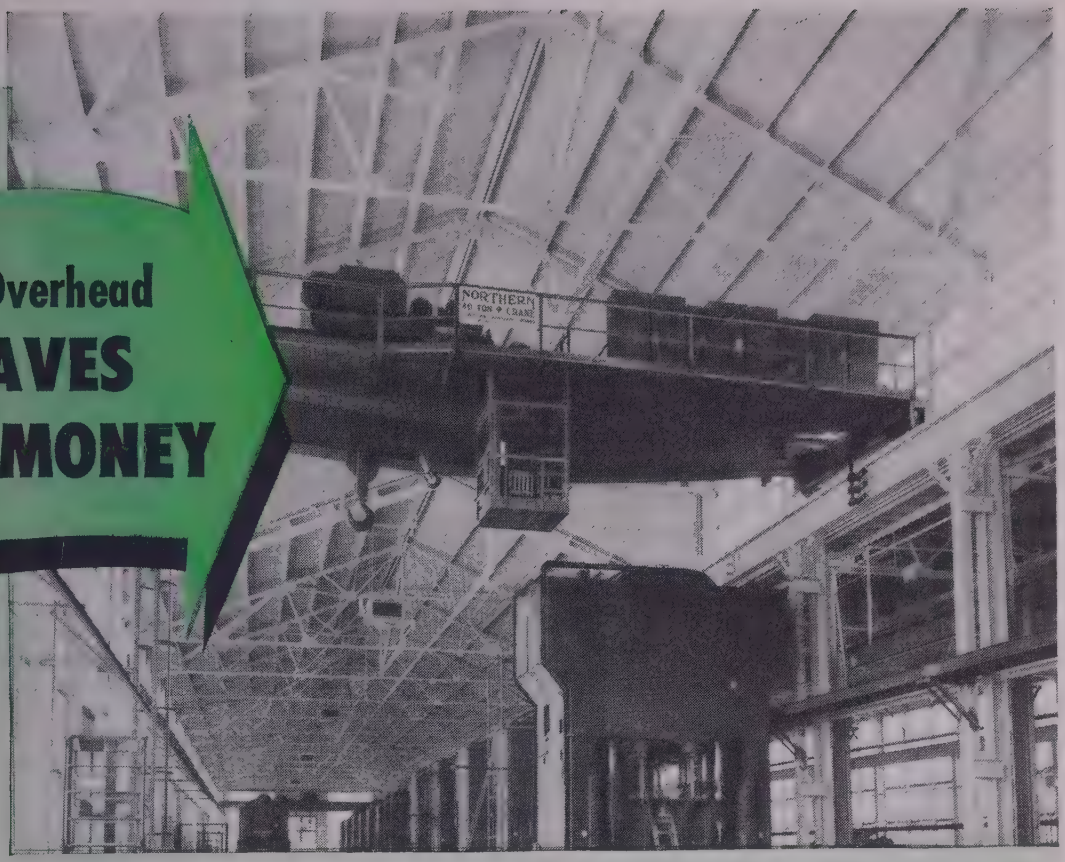
steels—the counterweighted coil raised from around the crucible free from the rotating portion of machine. The preheated mold, p viously clamped in place in the fixt and resting on its side, and the c cible are moved into contact w each other by a hand lever so t the orifice near the top of the c cible is in line with the mold spr The machine, which has variab speed drive and adjustable count balance, is set into operation. Wh it attains required speed the me flows by centrifugal force into t mold. This method assures go molecular structure and exact dup cation of the most intricate mold signs. One operator using one m chine can fill about 12 molds per ho

Vacuum Casting—Parts which p vide a good gating design adapt the selves well to vacuum casting. T method gives large grain growth a there is no turbulence in the metal it enters the mold. Another adva tage of vacuum casting is that t metal can be skimmed off, resulti in cleaner metal. The preheated m is placed on a special table and vacuum of 25 inches of mercury applied to the bottom of the mo Metal charges are made up the sa as for centrifugal casting and melted by induction, but pouring fr the crucible is by hand.

After the metal in molds has cool the clusters are shaken out, clean and given a smooth machine-li finish by a fine sand blasting ope tion, as shown in Fig. 4. The finish castings are then removed from t sprues by cutting with high-speed a rasive cutoff wheels. This operati is shown in Fig. 5. Average run rejects is about 10 per cent for clo dimensional parts, which is consider a low figure.

By nature of the Electronicast pro ess, certain limitations are placed the size of the parts that can cast by it. It is particularly adap able to small parts of intricate d sign where strength must be hi and cost of machining operations prohibitive. In general, 5 pounds considered the limit for parts man factured by the method. One of t chief advantages is the ability cast metals possessing high melti points and extreme hardness.

Because of the improved densi obtained by centrifugal casting, e cellent tolerances can be maintain For pieces of moderate shape, tol ances generally can be held to pl or minus 0.005-inch. Highly intrica shapes may require broader toleranc



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The use of a Binks Dynaprecipitor unit reduces fire and explosion hazards by removing all overspray from the room. The finishing department stays cleaner and more healthful — a pleasanter place in which to work.

Exhaust air washed 5 times: The paint and fume-laden air passes through 5 thorough washings before it is vented. See 5 stars (★) on Figure 1. Paint pigment is collected in the Dynaprecipitor. It will not unbalance the fan, or collect in the exhaust ducts or on the exterior of the building.

Dynaprecipitor stays cleaner much longer: All surfaces with which the overspray comes in contact are constantly flushed. Booth cleaning time is minimized.

Unique clog-proof construction: There are no nozzles to clog. The water is distributed directly from the large manifolds by means of deflector plates.

Uniform distribution of large water volume: There are no breaks in the water curtains . . . no gaps in the air-washing spray. There is more water circulated per lineal foot of a Binks Dynaprecipitor than any other booth.

Efficient paint reclamation: This unit washes out and collects an exceptionally high percentage of the overspray for reclamation. Heavy solids and light pigments collect in the fore part of the pan and are prevented by a divider in the pan from recirculation through the system.

Manifolds constantly flushed: The water constantly circulates through the manifolds to prevent settlement of sediment. This is illustrated in Figure 2.

Water economy: The water is circulated over and over again. Moisture eliminators remove all of the water from the air before it is vented.

FIG. 1
Diagram showing passage of air through a Binks Dynaprecipitor water wash spray booth. Stars (★) mark 5 places where the exhaust air is washed.

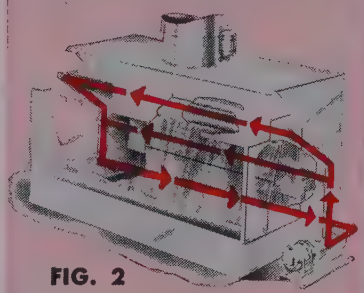

FIG. 2
Diagram showing the water circulating system.

FIG. 3
Diagram of a Binks down-draft Dynaprecipitor unit, showing the flexibility of the Dynaprecipitor principle. In this booth the air is vented through grills in the floor. This layout is ideal for use with heavy products such as automobiles, railway cars, etc.

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Carbide Die Practice

(*Continued from Page* 120)

(2200° F) than is used with chromiu types which are heated no high than 2050° F. This was brought o by S. P. Watkins, market develo ment division, Armco Steel Cor Baltimore, in speaking on "Proces ing of Stainless Steel Wire." Chron ium grades, he stated, are susceptib to grain growth at elevated temper tures as well as scaling heavily so is desirable to roll these grades at low temperature.

The Lead Problem—In order take heavy drafts on stainless, it necessary that the surface be coate with a metallic or other materi having a low antifriction and gallin properties. Up to the present tin lead has been the most satisfacto coating for the roughing drafts. Th speaker suggested that adequa ventilation should be provided f such installation inasmuch as the is some indication that the use lead prevents a health hazard ina much as dangerous concentration ma build up in the atmosphere aroun high-speed tandem draw machines.

If lead is employed for drawin lubricants, it is extremely importa that it be removed entirely before th wire is processed annealed. If n completely removed, it will ofte cause tipping of the surface durin annealing. Stripping is accomplishe by treating in a 5 to 10 per cent bat of nitric acid at 140/150° F for abou 15 minutes. To test for completenes of lead removal, a dilute solution sodium dichromate is sprayed o coils and if lead is present on th surface a yellow precipitate will for which indicates incomplete remova of the metal.

Particular emphasis was laid o the desirability of eliminating sulphu as an ingredient of drawing com pounds and lubricants particularl with regard to copper and nickel b E. G. deCoriolis, director of research and O. E. Cullen, chief metallurgist Surface Combustion Corp., Toledo O., in their paper on "Protectiv Atmospheres for Annealing Nonfer rous Wire." In order to insure bright ness of the annealed copper wire, it essential to maintain small but suf ficient amounts of elusive gases i the furnace atmosphere, such as car bon monoxide and hydrogen. Thei presence assures not only the com plete elimination of all free oxyge during the combustion of a suitabl air-gas mixture in an atmospher generator or in a direct fired brigh annealing furnace but also counter

lances traces of free oxygen which ay enter the furnace.

Present day air-gas proportioning vices are of sufficient accuracy to sure a constant flue gas analysis er the entire range of burner capities and turndown. Thus, the thor explained, the same composion of the gases within the furnace amber can be maintained regardss of the rate of firing.

Convection heating is recommended r copper wire and several other nferrous wires because of their mparatively low annealing temperares. Convection heating is much ore efficient at low temperature an is radiation heating.

If copper and nickel wires are analed in strand form, they may be ater quenched directly from the ating chamber, thus eliminating oling zone problems. Usually the ench water is maintained between 0 and 200° F so that moisture will aporate rapidly from warm wires.

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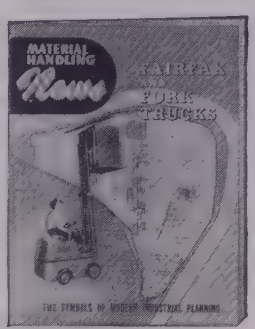

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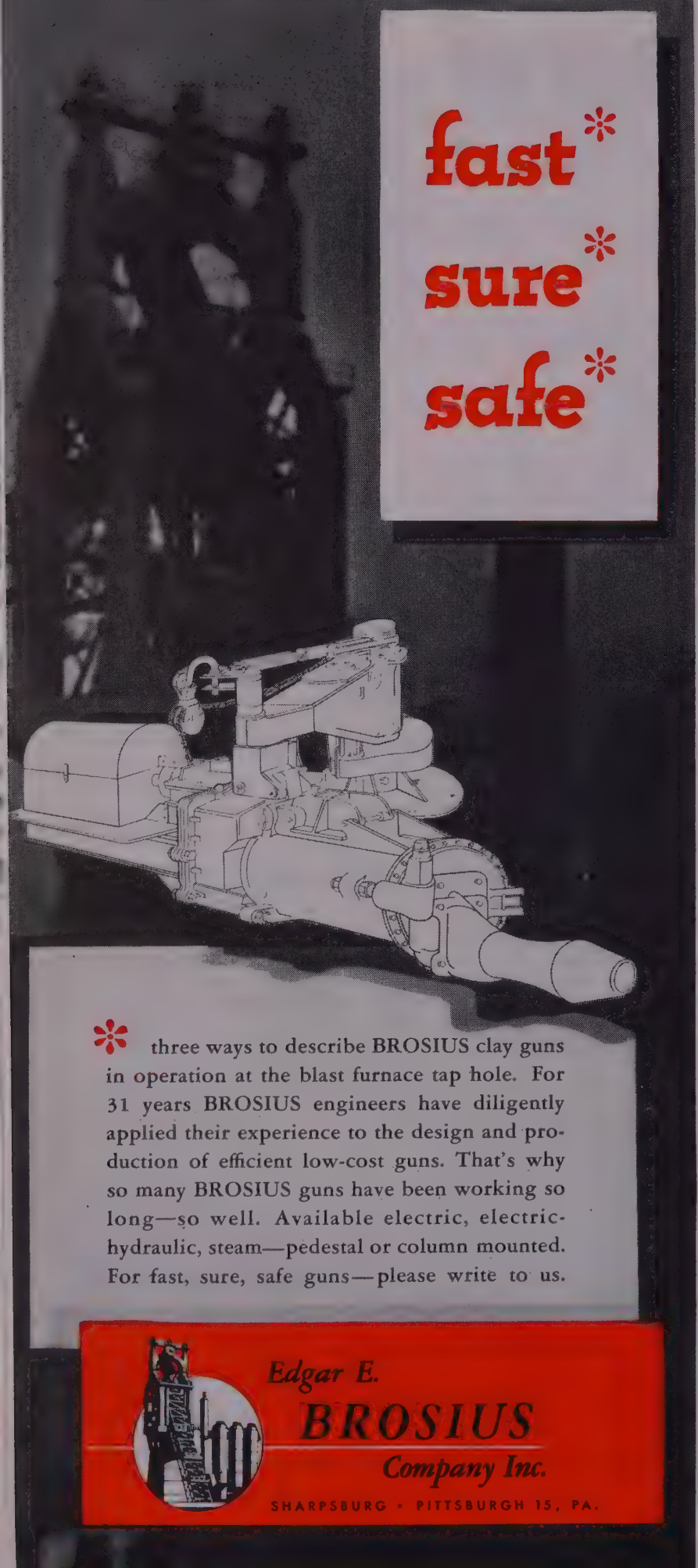

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Steel Valve Research

(*Concluded from Page* 124)

of actual thermal gradients within various valve designs is important. Such operating data are compiled by the laboratory by means of thermocouples and multiple recorders attached to the equipment that passes high temperature fluid through the valves. Pressure also can be applied to these valves for measuring creep and deformation at high temperatures.

An interesting operating test used by the laboratory involves the use of a valve stem thread tester that operates the stem up and down continuously at any predetermined temperature. The machine, especially designed by Edward, provides a travel of ½ up to 4 inches, torques up to 50 foot pounds and operating loads from 0 to 3000 pounds. It is designed so coefficient of friction between the thread and bushing can be measured continuously. Amount of wear or time of galling also is indicated by the unit. Wear of valve stems in the high pressure-high temperature valves is quite different from that encountered in most other machinery in that operations are quite slow while temperature and degree of lubrication is usually slight.

As the company uses the laboratory facilities to control incoming materials and various plant processes, it also includes some specialized equipment to conduct radiographic work, chemical testing, etc. A number of the rooms of the new laboratory are air conditioned to control humidity for critical work.

No Crumpled Steel in Fires

TO PREVENT steel from crumpling when it is exposed to hot flame in burning buildings, Eagle-Picher Co., Cincinnati, has developed a lightweight fireproof cement.

Tests of the protective coating have been completed by Underwriters Laboratories Inc. The material was rated by the laboratories and listed for re-examination service. When it is applied in a layer 1¾ inches thick, the cement will retard the effect of great heat for 3 hours. It is sold as a gray powdered material which is mixed with water to form a stiff paste. It is troweled onto ribbed metal lath wrapped around the steelwork to be protected. Product will be manufactured in the Eagle-Picher laboratories in Joplin, Mo.

Brochures describing the fireproof material are available from the company.

Four typical machine shops report

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"BETTER FINISH"
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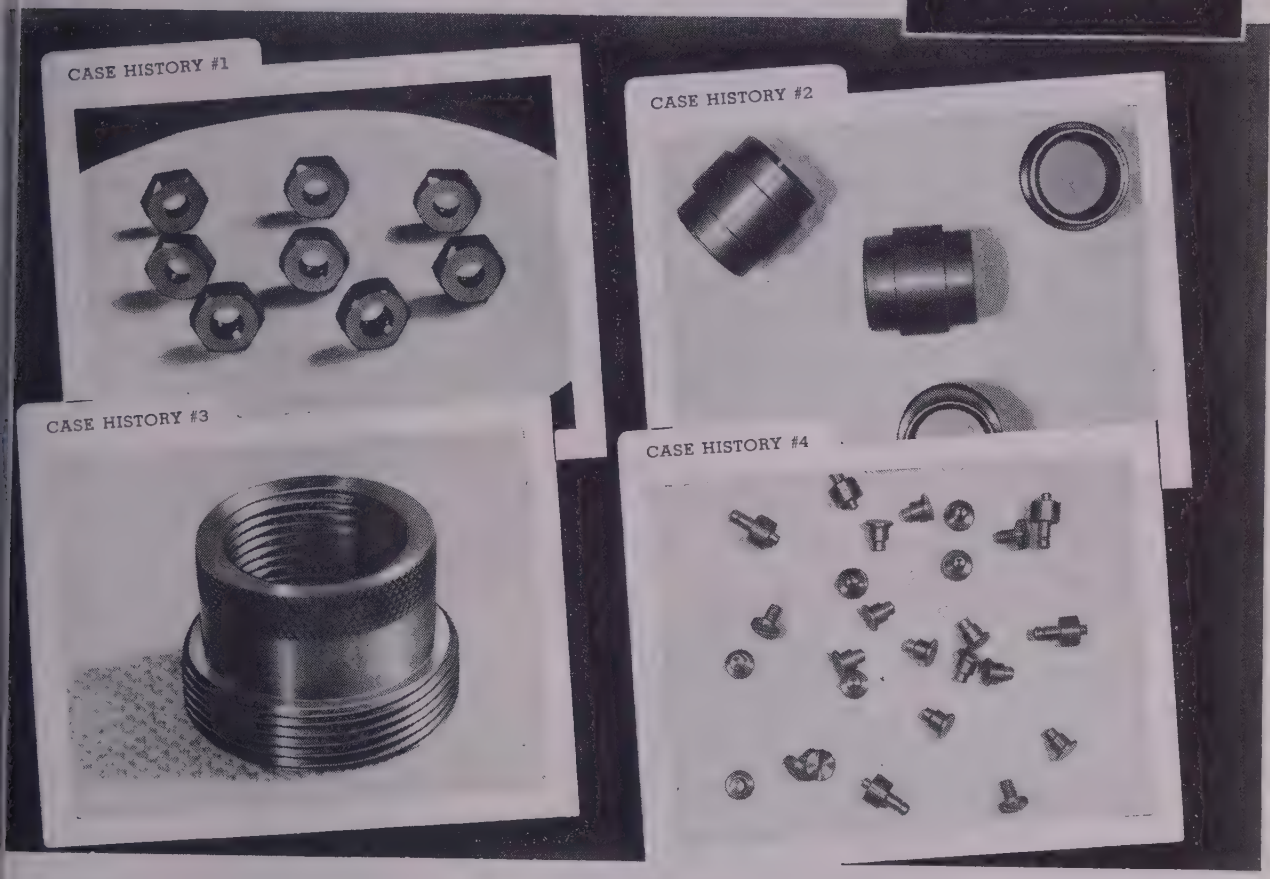

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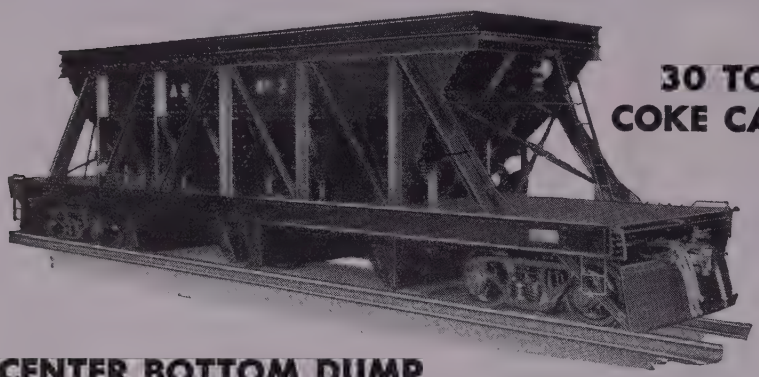
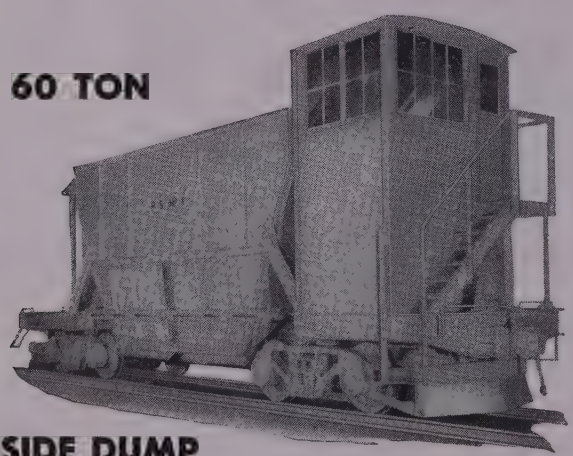


30 TON COKE CAR

CENTER BOTTOM DUMP

Trailer Type divided into two sections with rolling bottom dump gates controlled from locomotive cab. Car has self-aligning bearings, air brakes and standard safety equipment.

60 TON



SIDE DUMP ORE TRANSFER CAR

Two compartment hopper with separate discharge gates, independently operated from front and rear vision cab. Car is equipped with air brakes, self-aligning bearings and standard safety equipment.

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THE ATLAS CAR & MFG. CO.

ENGINEERS MANUFACTURERS

1140 IVANHOE RD. CLEVELAND 10, OHIO, U. S. A.

Physics of Powder Metallurgy

(*Continued from Page* 127)

daries on diffusion currents, allowance being made for possible anisotropy of surface tensions and grain boundary tensions to stress was discussed. The mechanism of changes occurring in the density of powdered metal compacts and experiments designed to reveal the kinetics of the process were described in a paper by A. W. Postlethwaite and A. J. Shaler of Massachusetts Institute of Technology. Radiographic techniques were used to study the shrinkage of synthetic pores in massive copper.

A discussion of electrical properties as indicators of the degree of sintering was presented in a paper by H. H. Hausner and J. H. Dedrick of Sylvania Electric Products Inc. A sintered material was represented as an electrical network and the total resistance shown to be a composite of parallel and series resistances. Measurements of the resistivity or its temperature coefficient were said to be more informative and more easily applied than other means, such as density measurements. The electrical properties were described as sensitive indications of changes occurring in the earliest stages of sintering, during which the other physical properties showed hardly any variation. Techniques were described for utilizing electrical resistance determinations in the study of various stages of sintering in vacuum and in reducing or protective atmospheres.

Mechanism of Sintering — Two papers were presented on the mechanism of sintering in the presence of a liquid phase. F. V. Lenel of Rensselaer Polytechnic Institute described the sintering of compacts made of 80 per cent iron powder and 20 per cent copper powder by weight. The compacts were sintered between the solidus and liquidus temperatures of the alloy system, where an appreciable amount of liquid was formed. The iron particles were slightly soluble in the liquid. The principal variables studied were the effect of particle size of the iron powder on the rate of densification and upon the rate of growth of the spherical iron particles in the microstructure of the alloy. The second paper, by R. Kieffer of Metallwerk Plansee, Austria, was read by S. J. Sindeband of American Electro Metal Corp., and concerned the sintering mechanism of carbide-binder compositions in the presence of a liquid phase. When compacts of tungsten carbide and cobalt powders were subjected to heat

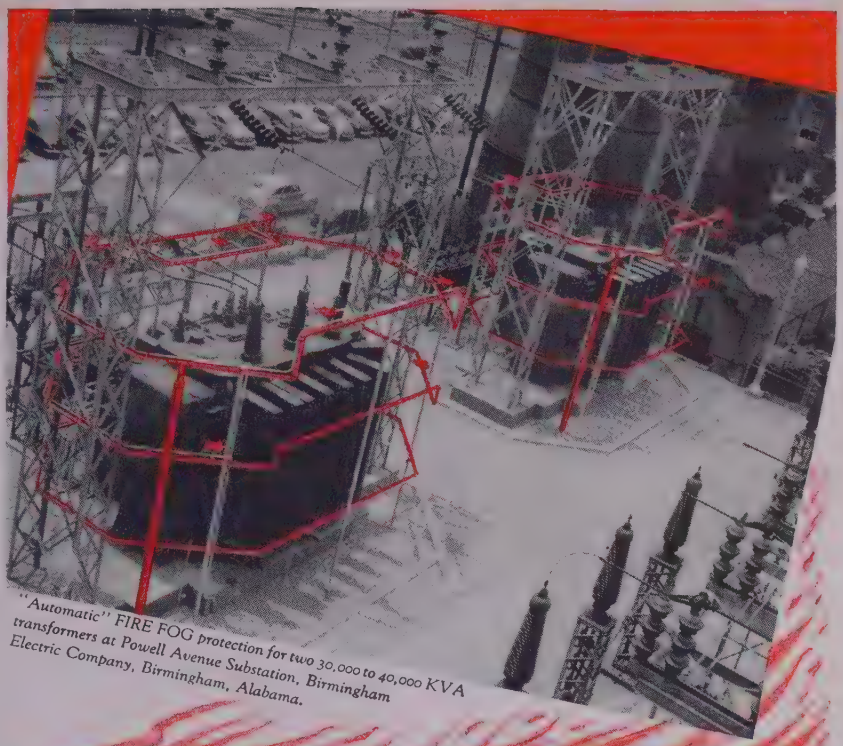
formation of skeletal bridges of bide was disrupted during the sin- ing process and then reformed ough precipitation. Density, hard- s, and transverse strength were ussed in relation to the percent- of cobalt and to sintering time i temperature.

An investigation of the properties tungsten powder by reduction m its oxides was reported by B. pelman of Sylvania Electric Prod- s Inc. Rates and mechanism of uction of tungsten trioxide by hy- gen and the resultant alterations the powder composition were des- bed. Distinguishing features of tal powder prepared by hydrogen uction of its oxide were found to (a) presence of sintered agglo- rates which behave essentially as gle particles, and (b) presence of res of varying size depending on e time and temperature of sinter- g.

Titanium Carbide Powder—Produc- n of pure titanium carbide powder means of carbonizing gases was cussed in a paper by V. Fattinger the University of Graz, Austria, ad by J. L. Zambrow of Sylvania ectric Products Inc. Formation of ry pure carbides was accomplished reaction of titanium in either the lid or gaseous phase with carbon- ng atmospheres.

The techniques used to prepare loy powder products from fully loyed powders were described by Comstock of Stevens Institute Technology. Several methods of rming ferrous and nonferrous alloy wders were discussed and the use these in sintered compacts was own to give better homogeneity an powders of separate metallic mponents. Examples given of alloys epared by this method were Co-Cr- i, Cu-Pb, brasses, bronzes, carbon d alloy steels, and special heat- sistant alloys. Hot and cold press- g procedures were described for loy powders.

Hot Pressing—A survey of princi- es and present status of hot press- g was presented by C. G. Goetzel the Sintercast Corp. of America. eed for special equipment and im- roved techniques was stressed as eing essential for future expansion industrial production by hot press ethods, which have been largely ex- erimental to date. Complete densi- cation has been demonstrated for arts made from copper, gold, rasses, bronzes, irons, steels, and emented carbides. Hot pressing was hown to give a marked improvement n hardness, compressive and tensile trengths, and ductility over conven- ional cold pressing methods. Prob-



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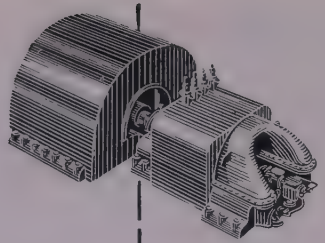
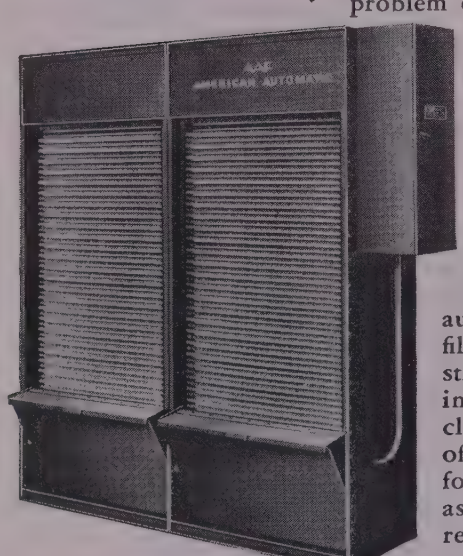


New life expectancy for impeller blades ..with Super-Clean Air!

ABRASIVE dust and dirt entering a high-speed rotary blower are sure death to steel impeller blades. When these blades hit this grit-loaded air, it's like trying to cut through a sandstorm. Rapid wear and erosion result, and you have a replacement problem on your hands.



But there's a sure-fire answer to this problem: AAF Multi-Duty Air Filters. Installed at the blower intake, AAF Multi-Duty filters out abrasive particles—preventing this killing dust and dirt from reaching the rotary blower.

The AAF Multi-Duty is an automatic, self-cleaning air filter. Overlapping panel construction combines self-cleaning and high efficiency air cleaning as integral functions of the operating cycle. Uniformly constant air supply is assured as operating resistance remains fixed when once established for a given dust concentration.

Increase the life expectancy of your impeller blades with AAF Multi-Duty Air Filters—you'll find the cost is only a fraction of the savings. Write for complete information or call your nearest AAF representative.

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AIR FILTERS
AND DUST CONTROL EQUIPMENT

lems of heat-pressure-time relatio ships and of heat-resistant die m terials and lubricants were point out.

A study of the pressing of me powders and of theories of pressi phenomena was presented by R. Seelig of the American Electro Me Corp. An analysis of the behavior metal particles under pressure w made to show the influence of p ticle size and of die shapes. Rubb washer models were studied to sh the movement of particles und various compacting conditions, p viding a graphic demonstration packing, deformation, and cold wor ing. Effects of lubricants on res tivity of copper powder compa were shown, and evidence was p sented which supported a theory sintering at room temperatures.

A new technique of examining su grain structures with the electr microscope was described in a pap by Laurence Delisle and G. A. Da of Sylvania Electric Products I Studies were made of tungsten spe mens and single crystals of copp and a series of electron photomic graphs clearly showed the sub-gra blocks. Sizes of the blocks and th degree of disorientation within t individual grains were of the sa order of magnitude as the valu calculated from x-ray results a those obtained by other techniqu The observations appeared to co firm and illustrate the existence complex grain structures necessa to explain the physical behavior metals. A paper by A. D. Power a I. Kakascik of the Radio Corp. America described the use of t electron microscope for the evaluati of particle size and distribution tungsten and molybdenum powde The method was used to differenti between powders used in wire man facture as an indicator of those l which would be satisfactory for p duction. The electron microsco technique was described as a mea of correlating size distribution curv with production efficiencies, this co relation occurring for about 75 p cent of the lots tested.

Diffusion in Fluorescence—A pap on the role of diffusion in fluorescen was presented by K. H. Butler of S vania Electric Products Inc. Pro lems confronting the fluorescent e gineer were discussed in regard the formation and growth of cryst and the development of fluorescen in ionic phosphors. The case of t preparation of calcium halo ph phates was cited to show how t formation of crystals from reacti components was accompanied by terdiffusion of various ions. T

EACH month *The Saturday Evening Post* readers by the thousands see a Nicholson cartoon ad like this which helps to make "Nicholson" the most widely remembered name in files. But industrial production heads and workers know these famous files for their *practical* qualities . . . for having all the essential requisites of "the perfect file," to wit:

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- **ACCURATE CUT**—teeth of even height, sharpness and spacing to assure full, smooth bite.
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LONG ANGLE LATHE FILE
to produce a fine finish on metal being turned in a lathe.

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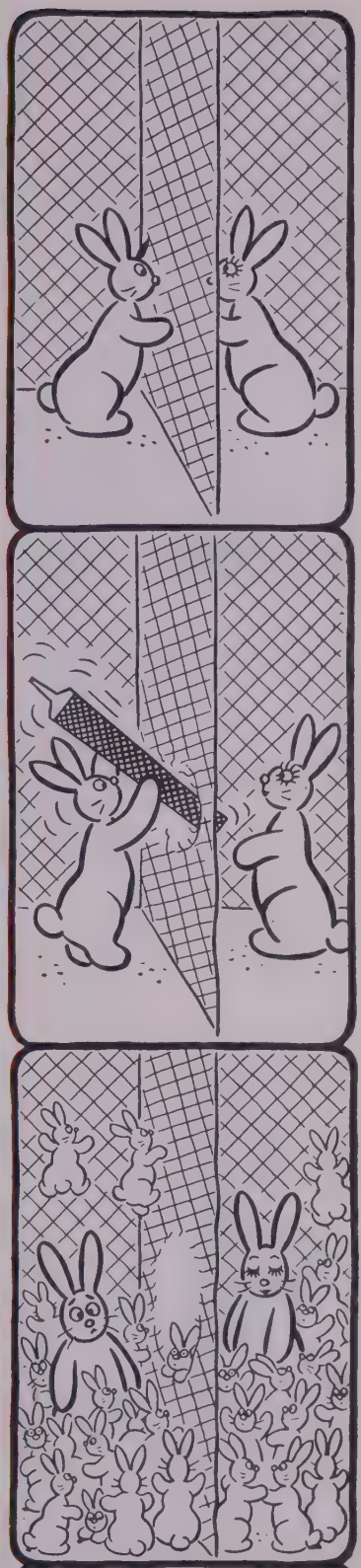

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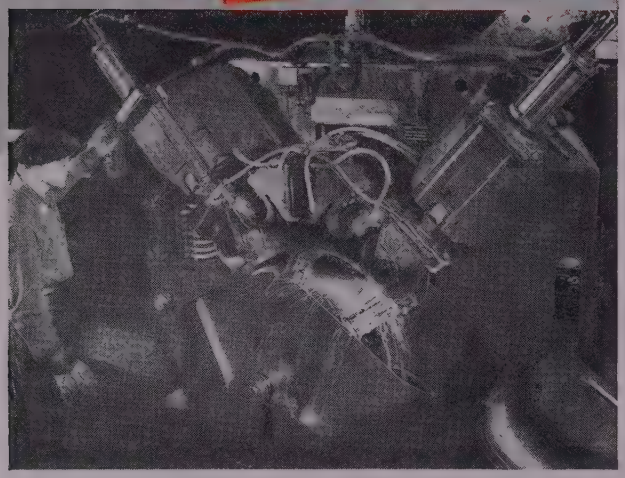

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Resistance welding is at its highest development, from a time and cost saving standpoint, in some of the elaborate setups used in the automotive industry. For welding equipment alone, investments of several million dollars are commonplace, and months are spent in planning and development.

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This consultation service regularly used by mass-production experts is available to the smallest user of resistance welding, and at the same cost—that is, no cost at all. Weiger Weed & Company, Division of Fansteel Metallurgical Corporation, 11644 Cloverdale Avenue, Detroit 4, Michigan. 11505-B

This book contains latest information on resistance welding—with description and illustrations of Weiger-Weed complete line. Send for your copy gratis.

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Resistance Welding ELECTRODES
DIES • TIPS • WHEELS • HOLDERS

diffusion progressed to the st where stoichiometric proportions w reached and a definite apatite str ture was established. The compo tion-time-temperature dependence particle growth was pointed out, diffusion of activator ions into ho in the crystal lattice was shown be related to the development fluorescence.

New Mold Steel Offered

MANY intricate mold shapes can hobbed in one operation, deeper i pressions can be pushed with prese equipment, and more accurate rep duction of hob design is possible w a new steel announced by Carpen Steel Co., Reading, Pa. Known Samson Extra, it is the result many years of research and eff to develop an alloy steel which wo provide excellent hobbing qualit plus good machinability with hi core strength. The steel has a ma mum Brinell hardness of appro mately 105.

Field tests show that mold cavit made from the new steel have unus ally high strength and resistance sinking, because the yield strength the steel when oil quenched is dou the 38,000 psi of a good grade hobbing iron. Average properties the steel after case hardening are follows:

	Oil Quench	Wa Que
Case Hardness—Rockwell:	C-64	C-6
Core Hardness—Rockwell:	C-20	C-2
Physical Properties Core—		
Tensile:	108,000	120,
Yield:	69,000	91,

Although the new steel is anneal for easiest hobbing, and is therefo soft, it machines very satisfactor because of its analysis and control manufacture.

Announces Scholarship Rules

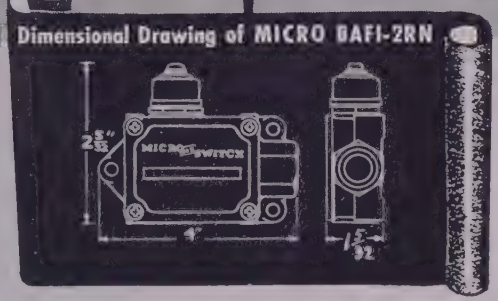
NOW available is a 24-page book containing rules and conditions the 1949-50 engineering undergr uate award and scholarship progr of the James F. Lincoln Arc Weldi Foundation, Cleveland. In additi to the rules and conditions for p ticipation in the program by en neering undergraduates, the book also contains information about pr ious award programs and inclu descriptions of some of the winni papers.

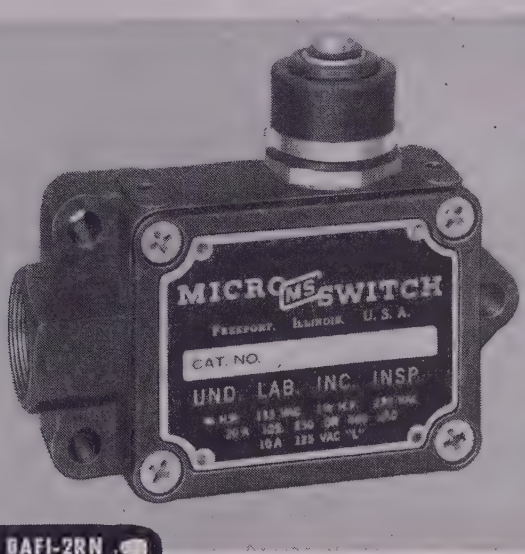
Suggested subject matter for s dent papers and a welding bibliog phy are also presented. There 37 pictures taken from previ award papers which show some the ideas on welding and its appli tion for which awards have b made.

MICRO Precision Switches

Which combine high electrical rating with high inrush capacity

1. MICRO BAFI-2RN2 die cast enclosed switch with adjustable roller arm actuator. Both of these switches are available in right- and left-hand designs.





2. MICRO BAFI-2RN die cast enclosed switch with plunger actuator. Note synthetic rubber seal boot which resists entrance of oil, moisture, dust, etc.

These two MICRO die cast enclosed switches offer plant engineers an ideal high-capacity precision switch to handle the high current inrush required in the operation of solenoids, motors and tungsten lamps.

These switches, available with either plunger or roller arm actuators, are Underwriters' listed for 1½ horsepower motor at 230 volts a-c; ¾ horsepower motor, 115 volts a-c; 20 amperes, 125, 250 or 460 volts a-c; tungsten lamp, 10 amperes, 125 volts a-c. They are rated for 75 amperes inrush capacity at voltages up to 460 volts a-c.

The rugged die cast housing insures protection against mechanical damage or shock. A synthetic rubber boot on the operating plunger and a cover plate ring gasket keep out dust, dirt, oil and moisture. Ample wiring space is provided within the housing. The switches are available in right- or left-hand designs for adapting to mounting requirements.

These high-capacity switches are typical of the many types and varieties of MICRO precision switches, housings and actuators, which plant engineers have found invaluable in modernizing present plant equipment to do a bigger job. For complete information on what MICRO SWITCH can do for you, call or write MICRO SWITCH, Freeport, Illinois, or contact the branch office near you.

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MICRO MS SWITCH
TRADE MARK ®
A DIVISION OF FIRST INDUSTRIAL CORPORATION
FREEPORT, ILLINOIS, U.S.A.

MICRO . . . first name in precision switches

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INSULATING LADLE-TILTING MOTOR leads with "SCOTCH" Electrical Tape No. 27 at Griffin Wheel Corp., Chicago, Ill. Glass Cloth backing and Thermosetting Adhesive make this tape ideal for high-heat protection.

Scorching foundry heat can't harm wiring insulated with glass tape

After careful testing, Griffin Wheel Corp. in Chicago found "SCOTCH" Electrical Tape No. 27 gives dependable, economical, long-lasting protection under average foundry conditions.

This amazing tape is designed to solve your high-heat insulation problems. Its glass cloth backing will not burn, stretch, shrink or rot. Adhesive is tacky for easy application, thermosetting for firm bond in high temperatures.

LEARN MORE ABOUT THIS MONEY-SAVING TAPE BY WRITING DEPT. ST-119 TODAY FOR BOOKLET AND FREE SAMPLE.

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- **HIGH RESISTANCE**—won't burn, stretch, shrink or rot.
- **TOUGH**—high tensile strength.
- **NON-CORROSIVE** — contains no sulphur-bearing compounds.
- **REMEMBER** — for normal temperature conditions, "SCOTCH" No. 33 Electrical Tape — plastic-backed, does a thorough, permanent job.

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SCOTCH BRAND
Electrical Tape No. 27

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Flame Fabricating

(*Continued from Page* 128)

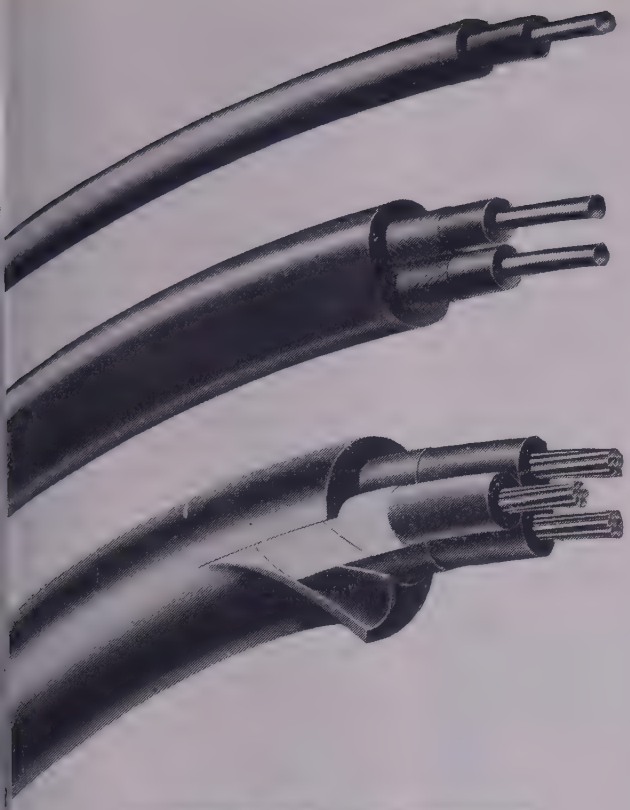
rection to be made quickly and ea and without moving the structur member far out of its usual p through the shop.

Girder flange plates 2½ inc thick, for example, that are cu by the welding that connects them the girder web can be made flat square with the web by heating th along the center of their outer f with a large multiflame oxyacetyl torch moving along the girder a speed at 6 to 12 inches per min Connection plates at the ends beams and trusses can be simil straightened and the flanges of w flange beams can be made squ with the web by judicious heat Experience in at least one plant shown that the shrinkage effects local heating can sometimes be u to straighten plates that would br if they were straightened by hamm blows or other mechanical me It also has been demonstrated t excessive or improper application heat shrinkage can tear steel ap

Expansion of the nation's highw system promoted greatly the use oxyacetylene flame. The motori demand that small bridges be p tically unobservable as he cro them has engendered the deve ment of bridges made of long ro beams cambered or curved vertic to fit the contour of the roadw The cambering of large beams tha offered by the steel mills is not curate enough for this use and it ten does not fit the dimensions are required by the engineering signs. It was natural, under th circumstances, for shop men fam with the power of oxyacetylene fl to apply it to the job of providing curate camber.

Cambering Beams — Basic pri ples of cambering beams by shrinking are well established. beam is set upside down with ports under its ends only. Hea applied to the uppermost flange flange which will be the bot flange in service). The beam arches upward under the influ of the expansion of heated metal, as the flange cools the shrinkage accompanies local heating will sl en the flange and the beam will c downward toward the camber th desired. Skill and experience ar quired to judge from the behavi the beam, as it is heated, the am of heating necessary to obtain specified camber.

An early method of heating flanges of beams to be cambered to heat several zones about 3 in wide across the entire flange so



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Pick Durasheath for power distribution: small size or large . . . one, two or three conductors . . . to carry from 0 to 5,000 volts. Then use this type in any installation you like: buried directly in the ground . . . in conduit . . . suspended from poles . . . or in a run that includes all three. Following are some of the characteristics of Durasheath that give it this versatility:

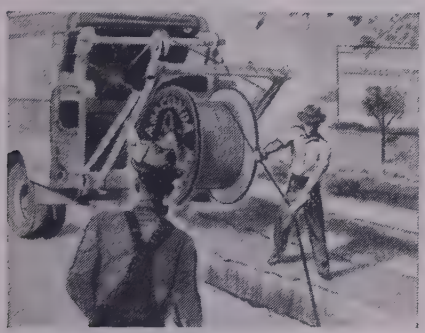
Durasheath is *unaffected by electrolysis*, corrosion and extremes in temperature.

High resistance to oil, flame, abrasion, cutting, impact and the moisture, acids and alkalies found in the soil.

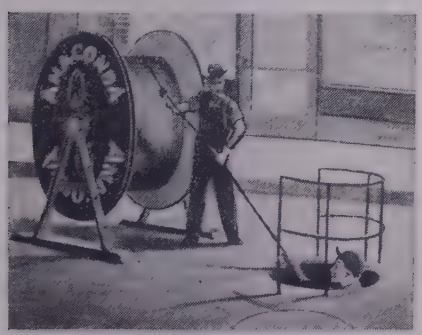
Light weight—greater strength.

More flexible, easier to handle.

For power distribution between industrial plants, in street lighting systems, airports, mines, railroad signal systems, farm buildings and real estate developments—to mention a few—use Durasheath, the all-purpose cable. Anaconda Wire & Cable Company, 25 Broadway, New York 4, N. Y. 49421



UNDERGROUND. Toughness of neoprene jacket assures long life of Durasheath when installed directly in the ground.



IN DUCT. Moisture, oil, acid resistance of neoprene jacket make Durasheath an ideal cable for this application.

IN THE AIR. In single or multi conductors, Durasheath truly is a one-type cable for all-type use.

Anaconda **Durasheath**

ANACONDA from mine to consumer

THE ALL-PURPOSE CABLE

"King Tut tomb" ovens installed in 1916 and still used successfully for long-cycle annealing of heavy castings.
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The first continuous controlled-atmosphere furnace heated by radiant tubes producing economically at International Harvester Co. since 1936.
Three of six automatic overhead type controlled-atmosphere furnaces recently installed at International Harvester Co., Chicago.

Since 1916—

Holcroft

means **ECONOMY** in

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Holcroft furnace design is based on *complete metallurgical and engineering service*. We design each furnace for its individual application, selecting *without bias* the elements best suited to the job; and in so doing, we constantly develop improved features and processes. As a result, Holcroft furnaces meet every production requirement *at minimum over-all cost*—for malleable annealing and for *every other* heat treating process.

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the steel was at bright red throughout its thickness. In scheme the weight of the beam a major factor in upsetting the h ed metal and the number of z heated largely governed the am of camber produced. The camb shape was a broken curve of stra segments with a small but s bend at each heated zone. scheme was satisfactory for cam ing beams with very wide fla that were only 14 to 16 inches d but it was not effective for la beams, even when weights were on the beam to increase the upset of the heated zones.

It has been found, however, this general idea can be made ef tive for large beams if the hea zones of the flange are extended a distance equal to half the depth the beam and if the web at e zone is simultaneously heated i triangular area extending from heated zone of the flange to the ter of the web. This is still a fa common method of heating beams camber them but it is rather s and expensive.

Heating Flanges — Searches faster and more economical sche for heating the flanges of beams for means of producing smoot curved cambers led to the use longitudinal heating of the be flanges to subcritical temperatu Initial trials of this scheme w made with extremely large mu flame heating torches and with heated zones intermittent along length of the flange. Recent w however, has been with torches about 250 cu ft per hour capa making continuous lines of h Control of the amount of heat s plied is gained primarily by skil adjustment of the speed at which torch travels, but secondary con is had from adjustment of the siz the flames and distance from to tips to work. Number and arra ment of the torches across the b flange are chosen to suit the din sions of the beam being cambered

One shop has recently cambere large number of 16-inch wide-fla beams with 2¾-inch camber in feet. Another shop has obtaine camber of 11 inches in 36-inch w flange beams 80 feet long. Cam of 1½ or 2 inches can be put beams with less than 1 hour's w by a single workman. Camber curvature of only part of the le of a beam can be provided if i needed and, by heating the upper lower sides of each flange simult ously near one edge, beams ca curved laterally to fit engineerin architectural requirements.

Paint Characteristics — Dev

nt of new types of paint vehicles to 15 years ago was a prime fac- in creating a new use for the acetylene flame. The new paints i different drying characteristics n the paints traditionally used in structural industry and they re- red more thorough cleaning and ing of the steel surfaces before initial or prime coat of paint was on. Experiments with steel that been warmed just before it was nted showed promising results and oxyacetylene flame was put in to provide similar conditions on el in structural shops. Special ab or ribbon burners were devel- d, with particular attention being ected to providing the highest pos- e flame velocity and intensity t is attainable.

ustrial Hygiene Book

NTRIBUTIONS from leading in- trial hygiene experts, covering h general and specific subject tter, are included in the second a two-volume work *Industrial Hy- ne and Toxicology,* edited by nk A. Patty, in charge of General tors Industrial Hygiene Depart- nt. Published by Interscience blishers Inc., New York, the book nine chapters authored by the or, a former industrial hygiene ert for the U.S. Bureau of Mines.

ubject matter includes techniques good industrial hygiene admini- ion and such factual material in form of tables, charts, diagrams analysis on various environmen- factors affecting industrial work- These include gases, dusts, va- s and fumes; solvents; x-rays, ma rays or radioactive mate- ls; abnormal temperatures and hidities; plant lighting; noise in- sity; various industrial raw mate- s and their by-products; skin in- mations; ventilation and personal piratory protection devices.

ter Improves Product

MINATION of almost all rejects, rovement in the product and re- ion of production costs has re- ed from the installation of an tronic induction heater for the ing of beater-blade assemblies portable mixers in the plant of ter Spring Co., Lansdale, Pa. d at 20 kw output at 530 kc, heater, made by General Electric Schenectady, N. Y. was installed 1947 and is said to have reduced uction cost by 1 cent per unit or t $36 per day.

x beater blade subassemblies are ted into a jig in the induction ing operation. Flux and a small

"PACK-BEARERS"

...fine for jungle trails.. but costly in your handling operations

MECHANIZE material handling—release manpower for production operations—and you cut excess material handling costs—speed production.

Wherever packages, parts, or units are handled—loose or in containers—there is a type of Standard Conveyor (gravity or power, roller, belt, slat, chain, wheel —portable unit) expressly designed to do each particular job best.

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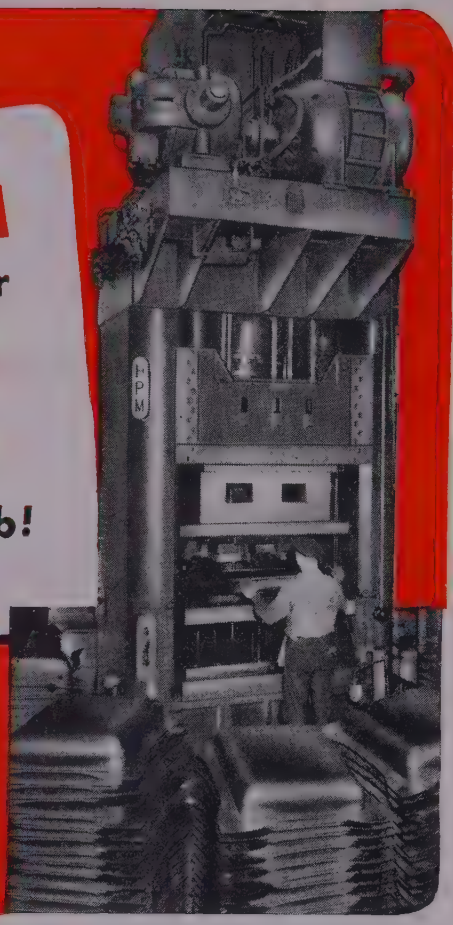
THIS H-P-M
Saves its owner
$60,000 per year
on a single job!



That's just one of many savings credited to this H-P-M Press

These drawn cabinet tops—960 of them in 8 hours—for Lincoln's new "FLEET-ARC" welders also make a gasoline tank when welded together

Increased output, higher quality performance, lower labor and maintenance costs—add them up and this H-P-M Fastraverse Press shows annual savings of $60,000 on one job alone for Lincoln Electric Company!

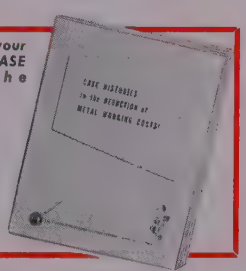
This is just one of the many jobs this versatile H-P-M Press performs. It forms heavy metal sections which replace castings. It coins parts that replace forgings—parts formerly purchased outside. As a result, many machining operations are eliminated, cutting Lincoln's costs and improving their competitive position.

For YOUR Protection

Take a tip from Lincoln Electric! Install H-P-Ms for deep-drawing, forging, die straightening, coining, forming and assembling operations. H-P-M presses are completely self-contained, all-hydraulic — easy to install, quick to set up, simple to operate, low on upkeep.

Ask an H-P-M engineer how you can save money with H-P-M presses, or write for the facts today.

Write today for your free copy of "CASE HISTORIES in the REDUCTION of METAL WORKING COSTS". It tells how manufacturing costs are being reduced in many prominent production plants by H-P-M pressure processing.



THE HYDRAULIC PRESS MFG. COMPANY
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Branch Offices in New York, Philadelphia, Detroit, Pittsburgh and Chicago. Representatives in other principal cities. Export Dept: 500 Fifth Avenue, New York, N.Y. Cable—"Hydraulic"

HPM

All-Hydraulic Self-Contained **Metal Working Presses**

REVOLUTIONIZING PRODUCTION WITH HYDRAULICS SINCE 1877

square of silver brazing alloy placed on each subassembly w the four points of the blade together. After the beater ste placed over this point and lo into position, the jig indexes beater assemblies into the work of the heater. Blade-stem joints brazed first, after which the h automatically brazes the b guards to each stem.

Heating cycle for the bra operation on six beaters at one is 11 seconds for the blade-joints, a ¼-second delay, and 12 onds for brazing the batter gu to the stems. Hunter reports an average of 1800 beater blades brazed per 8-hour shift. When heater is not being used on t assemblies, it performs special nealing and brazing operations springs and stampings made by company. Many of these operat are on work which was previo turned down.

Washer-Drier is Rapid

VARIETY of sizes of cylindrical may be washed or dried, or both the rate of 300 per minute by a c pact and efficient machine requi a space of 3 x 7 feet. The Rex B Brush machine, developed by C Belt Co., of Milwaukee, Wis., sists of a preliminary conveyor, r conveyor, rubber roll, brush, and motors. It requires no operator normal operation.

Preliminary feeding conveyor ries cans through a spacing wor the main conveyor which places t horizontally on a hardened stai steel bar between the rubber roll the brush. After the scrub operation, the brush removes of the water from the can so th leaves the machine only slig damp. An adjustable stripper b removes surplus water from brush. When the can reaches the of the brush, it is automatically turned to an upright position placed on the next conveyor r for the following step in the pro ing line.

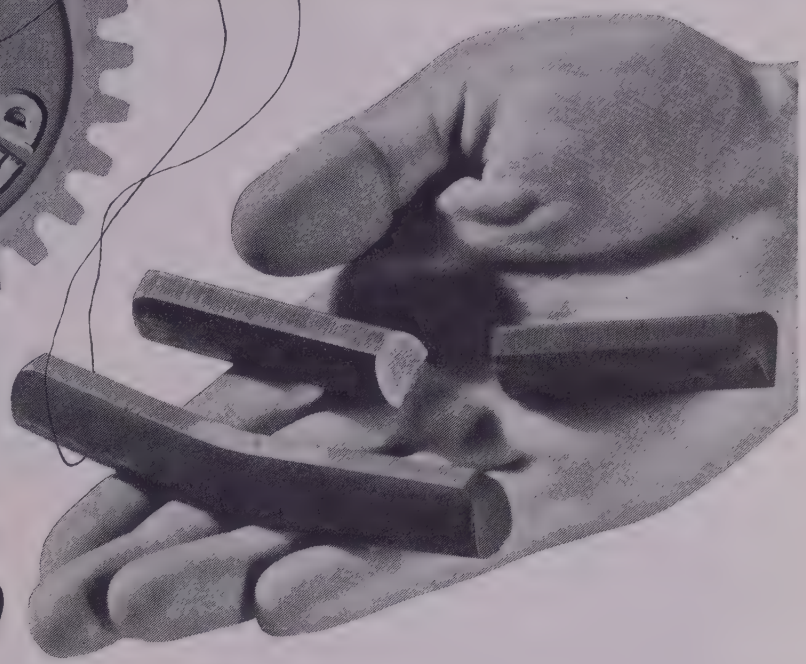
Chemical Melts Snow and Ic

PRODUCED in the form of m pellets is a 99 per cent active ch cal for the melting of snow or t ing of ice. Developed by Chem dustrial Co., Cleveland, the pro known as Melt, is said to ha thawing capacity per pound o pounds of salt. If used at the of a storm, it will melt the subse snow falls and it will leave no due.

YOU CAN BE **SURE**.. IF IT'S

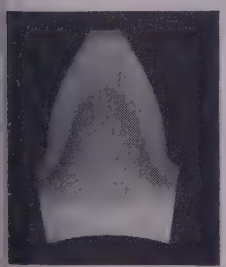
Westinghouse

TAPER-HARDENED

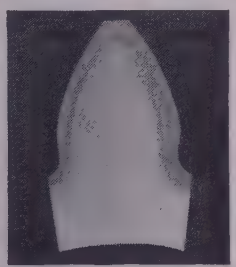


Hard and Tough

s "taper-hardened" tooth bends before it breaks



Taper-Hardened Tooth Section



Case-Hardened Tooth Section

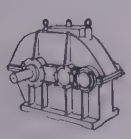
The taper-hardened tooth above bent under the same force that snapped the case-hardened tooth. Yet a test will show wearing surfaces of nearly equal hardness.

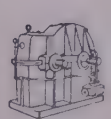
The cross sections at the left show why taper-hardened gears have resilience and life under their hard surfaces—why they last longer in punishing service—why they "roll with the punch". Notice the graduated hardness in the taper-hardened tooth—blending down the scale from maximum hardness at the surface to toughness at the ductile core. Compare it with the thin, brittle, shell-like hardness of the case-hardened tooth in which there is no give, no bend.

No wonder "taper-hardened" BP gear steel makes gears last so long.

For complete information on taper-hardening, write for free copy of "BP Gear Steel" B-4395, Westinghouse Electric Corp., Dept. 1111, P. O. Box 868, Pittsburgh, Pa.

J-07276





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SPERRY ULTRASONIC REFLECTOSCOPE

Reflectoscope, Type UR, Style 50E351.

Provides rapid accurate non-destructive testing of steel and other metals

Metals tested by the Reflectoscope are preferred by users who cannot afford lost machine and man hours. The expense of lost work on faulty metals and possibility of service failures are minimized when potentially harmful defects are located before fabricating or machining.

The cost per test is low because it is instantaneous. The operator touches the quartz-crystal Searching Unit to the surface and immediately "sees" through the metal. Discontinuities are revealed on the Reflectoscope screen and are located accurately. For full details write for new Bulletin 50-105.

• CONTROLLED SENSITIVITY —can be adjusted to meet quality control standards.

• PORTABLE UNIT — can be set-up quickly by one man.

• TESTS PARTS "IN PLACE" —locates fatigue cracks in shafts, rolls, axles and other stressed parts. Operates on 100-130 volt, 60 cycle current.

SPERRY REFLECTOGAGE. Measures thickness of metals and other materials by resonance at ultrasonic frequencies. Accuracy within 2%. Full details in Bulletin 3700.

SPERRY PRODUCTS, INC.
DANBURY, CONN.

Sperry

SP-159

LETTERS
to the Editor

Lubricant Speeds Drawing

In your Nov. 8, 1948 issue, published, on page 102, an articl titled, "Wire Drawing Speed creased 25 Per Cent". This a mentions "Banox" employed as bricant. We shall thank you t form us where it can be purch

J. Bonnet
Iron & Nonferrous Metals Technical Association
Paris, France

Details on Banox may be obtained Calgon Inc., 1934 Hagen Bldg., Pitts Pa.—The Editors

Savings in Packaging

The issue of Sept. 19, has ar ticle entitled "Packaged Savings page 45. We would appreciate detailed information on this new

E. Y. Bready
Director of Purchases
Standard Pressed Steel Co.
Jenkintown, Pa.

Packaging methods used by National Sc Mfg. Co. and other fastener producers, the users of National's products to sa least 5 per cent by reducing stock hol warehousing and shipping expense. Tech involves use of many separately wr small packages packed in one large c The small packages can be removed w repacking the entire carton when fill small order.—The Editors

Fundamentals Articles

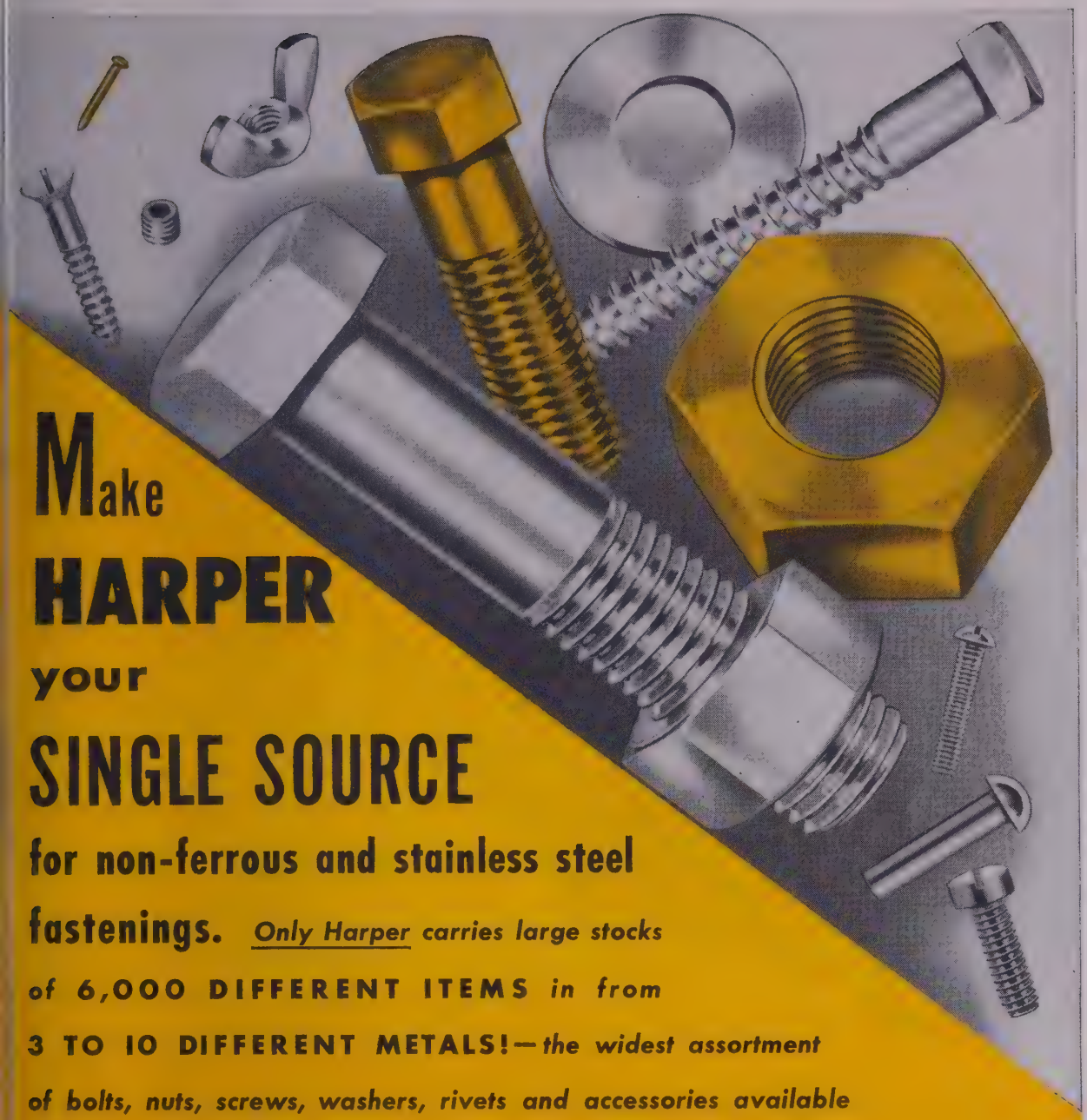
I am wondering whether or you have the articles on electric naces, written by Walter M. F worth, Republic Steel Corp., Mass O., which appeared in your mag several months ago, compiled in form. If so, I would appreciate mailing me a copy.

C. A. Kral, Asst. General Ma In Charge of Operations
Rolling Mill Division
Newport Steel Corp.
Newport, Ky.

These articles and others in the F mentals of Steelmaking series are avail reprint form from STEEL's Readers' Department. Upon conclusion of the all will be included in one book called, ABC of Iron and Steel".—The Editors

Over 2 Years Ago

Two or three years ago you an article describing a new high speed punch press for bla small parts, such at 1½-inch washers, at rates of 4000 to 800 minute. It wasn't a conven punch press design but both to bottom dies were mounted on trics which moved the dies along the continuous feed on the ma which feed was at a regular



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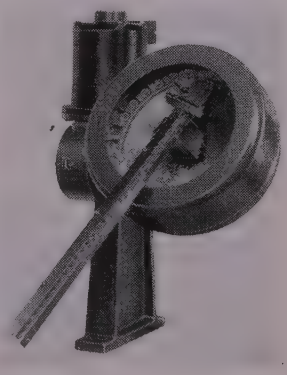
Just Another HOPPER APPLICATION!

DETROIT POWER SCREWDRIVER *MOTORIZED* HOPPER UNIT attached to conventional type TAPPING MACHINE

Here is another example of the wide versatility of this unit . . . Steel stampings are automatically selected and fed to air-operated index and dial for tapping operation, after which the parts are automatically ejected, entirely eliminating manual handling of parts. This application is just as readily adaptable to drilling or punch press operations.

The hoppers are completely motorized, and are self-contained units. They are made in six sizes: 8", 10", 12", 16", 24" and 30" diameters.



Submit samples for quotation

DETROIT POWER SCREWDRIVER CO.

2811 W. Fort Street
DETROIT 16, MICH.

without stopping. We believe press is being made by a comp down in the Cleveland, O., area would like to know the name of company.

George C. Price
President
Electrical Mfg. Co.
Battle Creek, Mich.

We believe you are referring to an a that appeared in the July 14, 1947 issu STEEL. Manufacturer of the press ment is Lempco Products Inc., Bedford, O.- Editors

Request To Reprint

Will you please grant Carne Illinois Steel Corp., Duquesne Wo permission to reproduce for distr tion to supervisors and appren welders the article entitled, "Sa Precautions in Arc Welding," wh appeared in the April 25, 1949, is of STEEL.

A. L. Norman, Superintender
Industrial Relations
Carnegie-Illinois Steel Corp.
Duquesne, Pa.

Permission granted.—The Editors

Reprints Dept.

We are desirous of obtaining a print of an article, "Hardening pacity of Engineered Metal Castin which appeared in your Feb. 21, 1 issue.

E. C. Wallace
Metallurgist
Barber-Colman Co.
Rockford, Ill.

In the April issue of *Metals Rev* I have noticed an abstract of article, "Operation of Statist Quality Control in a Steel Mill," wh was written by W. T. Rogers appeared in your March 14, 1949 sue. It would be greatly appreci if you could send me tear sheets this article.

Howard O. Schmidt
Aluminum Co. of America
Cleveland, O.

My attention has just been ca to a series of articles beginning May 2nd issue of STEEL on the s ject of "Production of High Tem ature Coke Plants", written by Ph S. Savage, vice president of Don Hanna Coke Co. of Buffalo, N. Would you please send me a rep of these articles?

Walter L. Slifer, Chief
Statistical & Research Sectio
Bituminous Coal Institute
Washington, D. C.

In your March 22, 1948, issue published an article entitled, "In in Ground Surfaces," by Leo P. T sov. Would it be possible to mail a copy of this article? One of foremen is interested in reading s

V. A. Wallace
Secretary to Resident Manag
New Departure Division
General Motors Corp.
Meriden, Conn.

Reprints of all of the articles are sent.—The Editors

EW, IMPROVED WIRE

For Manufacturing Recessed Head Screws

R. S. Simmons
Chief Metallurgist
Keystone Steel & Wire Co.

new process been developed by R. S. mons, chief tallurgist of stone Steel & e Company, t results in an proved wire k for manufuring recesd head screws. s unique proe starts with steel that is r drawn into the wire stock. The ace of the steel stock is improved uch an extent that it is comparable haracteristics to that found in the of high grade bars.

dvancement Over Normalizing Process

process is a refinement and adcement of the normalized proc. In air-tight vessels the steel k is heated under the action of trolled atmospheres to produce ructure and surface necessary to nstand the severe and drastic cold tting of wire to be made for ssed heads of all types. After this ial heat treatment, the stock is n through a special lubricant to intermediate wire size and then fully annealed in process before final drafting to the desired final size.

ailable in 12 Grades of Steel

stone's new wire for recessed d screws is furnished in the follow- steel grades:

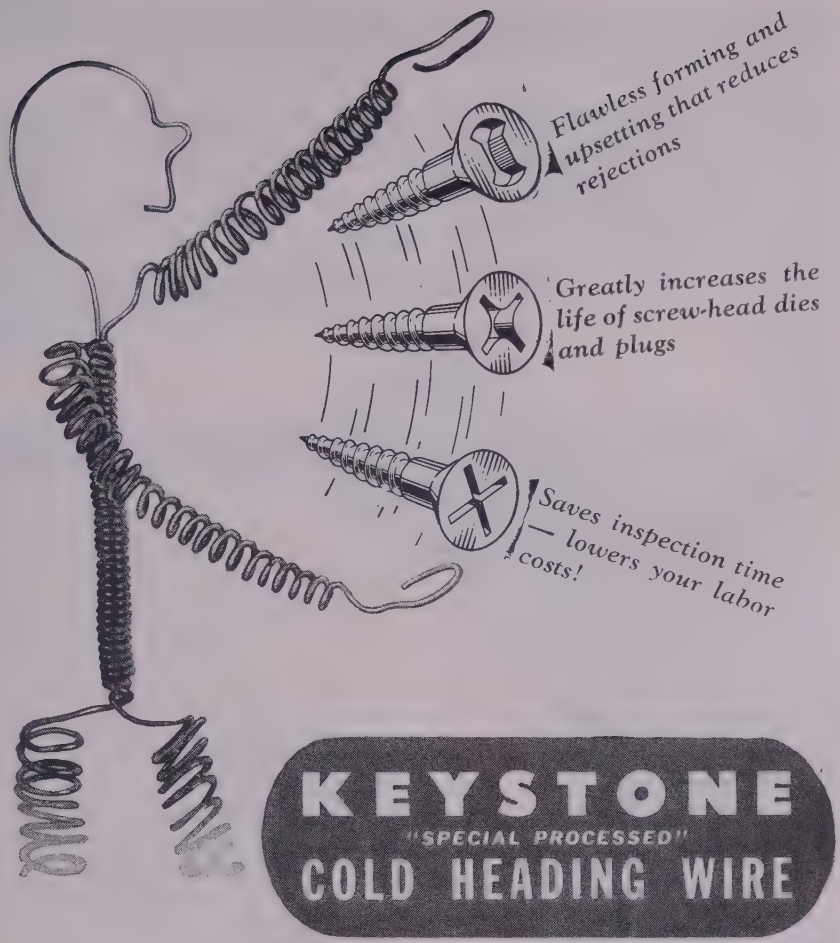
C-1006	C-1016
C-1008	C-1017
C-1010	C-1018
C-1012	C-1019
C-1013	C-1020
C-1015	C-1022

n be used in the cold upsetting of d, flat, oval, fillister, truss, bind- pan, hexagon, and slotted recesPhillips and Clutch Head Machine ws, Sheet Metal Screws, Cut ws, and Self-Tapping Screws.

Many Advantages

cold heading industry benefits tly from this new wire develd by Keystone . . . in increased of dies and plugs, in reduced ctions, in less machine down , and in savings of cost of exsive final inspection as well as tter finished product.

rtisement


Flawless forming and upsetting that reduces rejections
Greatly increases the life of screw-head dies and plugs
Saves inspection time — lowers your labor costs!
KEYSTONE
"SPECIAL PROCESSED"
COLD HEADING WIRE

For recessed heads, Keystone's new special-process wire delivers the desired upsetting and die forming qualities with such a high degree of uniformity that finished product rejections are practically eliminated . . . individual inspection of screws is no longer necessary . . . die and plug life are often more than doubled. This new wire effects considerable savings in the production of Phillips head, clutch head and cross recessed head screws.

Keystone is prepared to help solve any of your industrial wire problems. If special treatment is called for, Keystone's metallurgical research and testing facilities are available to supply the answers. We welcome your inquiry.

KEYSTONE
STEEL & WIRE CO.
PEORIA . . . ILLINOIS

Special Analysis Wire, Setting New Standards of Performance

Need Stainless Steel?

CALL US!

IT's always wise to "Call Us" when you need stainless steel. For it's a fact that *U·S·S* Stainless Steel is "tops" in quality, dependability and proven excellence.

Right now our stocks include No. 2B Finish Sheets and No. 4 Finish Sheets of uniform quality. Also bars, meeting high standards of machinability; plates up to 120″ wide and 360″ long . . . as well as welded and seamless tubing, pipe, angles, channels, welding electrodes in all standard grades and specifications are on hand for your needs.

So call our nearest warehouse or sales office. You'll get prompt, courteous service. Meanwhile, why not fill in and return the convenient coupon for our free booklets on U·S·S Stainless Steel? Do it now.

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UNITED STATES STEEL

lk Handling Truck-Tractor

Besides handling bulk materials in 2/3-yard capacity dump body, the l-Truk, designed by Kalamazoo g. Co., Kalamazoo 24F, Mich., is ilable with a platform body ipped with all-steel side and end es which are removable. It has a

ee-speed forward and reverse drive is operated like a tractor. Di- t discharge of materials from pers, bins or mixers into its dump y is possible. It is rear steering is capable of speeds up to 15 n.

ump body is standard. Platform y has a tilting feature which fa- tates quicker removal of load. vered by a 13 hp air-cooled motor, has a load carrying capacity of 0 pounds.

k No. 1 on Reply Card for more Details

rpens Broaches Accurately

ncorporating advantages of nting the broach between centers a stationary bed and traversing grinding wheel from tooth to h for faster and more accurate harpening is the cylindrical broach harpening machine offered by erican Broach & Machine Co., n Arbor, Mich. It can be used to

harpen internal broaches such as olute splines, helical splines, hexa- cam-shaped, irregular formed, ration and combination type. Mi- meter dial control wheels for the al traverse of carriage and in- of grinding spindle, variable d drive for rotation of broach, friction bearing rollers and hard- ened and ground carriage mounting rails are features of the machine.

Two sizes are available for the re-sharpening of round type broaches, the RBS-9-84 for broaches up to 9 inches in diameter and up to 84 inches long and the RBS-9-60 for broaches up to 9 inches in diameter and 60 inches long.

Check No. 2 on Reply Card for more Details

Coil Cradle for Punch Press

Designed for increased efficiency in the use of coil stock with punch press operation are Easy Load automatic coil cradles manufactured by Rowe Tool & Die Co., 1506 N. Industrial Blvd., Dallas, Tex. Unit may be moved from press to press by one man and may be loaded to capacity without auxiliary equipment. A width adjustment crank positions

separator plate and adjustment from minimum to maximum width can be made in less than 1 minute. Motor driven rollers are used for supporting and feeding coil stock.

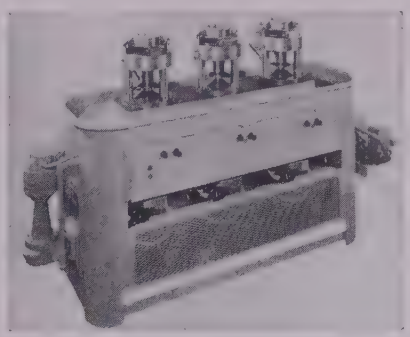
Smallest of the two motor driven cradles weighs 300 pounds, has a single-phase ¼-hp motor and handles coil stock up to 36 inches OD and up to and including 10 inches wide. The 330-pound large model has a single-phase ½-hp motor and handles coil stock up to 40 inches OD and up to and including 10 inches wide. Maximum rate of speed of both is 90 fpm.

Check No. 3 on Reply Card for more Details

Uses Collapsible Taps

Designed to handle collapsible taps ranging in size from 1½ to 4 inches is the Tapmaster No. 40 automatic tapping machine, manufactured by D. H. Prutton Machinery & Tool Co., 5295 W. 130th St., Cleveland, O. Taps are actuated by a cam which allows a rise after the tapping operation so that the facing or chamfering of the lower surface of the work can be accomplished by tools attached directly to the tap. In this way, an operation usually performed separately is done during the tapping cycle.

Use of collapsible taps in this type of work steps up production and eliminates abrasion occurring dur-



ing the threading out process. Work holding air fixtures are custom-made for each individual job. Fixtures clamp the work before the tap enters, hold it during the tapping and facing operation and release it when the work is completed.

Check No. 4 on Reply Card for more Details

Elevator Serves as Truck

Lance Co., 102 W. Fowler St., Milwaukee 3, Wis., is manufacturing the Mobile-Draulic lift, a combination hydraulic elevator and hand-operated four-wheel truck. Use will reduce materials handling time by placing metal sheets, bars, rods, etc., adjacent to fabricating machines. Regardless of the working height of machines, load on the lift is easily

moved and adjusted to that height. Elevating power is obtained through a hand-operated hydraulic pump.

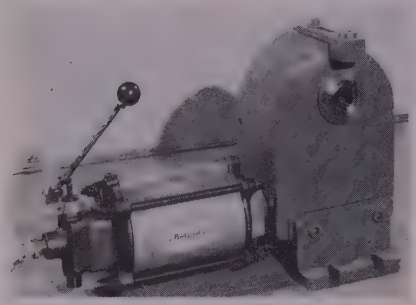
Lift may be stopped at any position within its 32-inch travel. Heavy steel tubular stock, angles and plates are incorporated in the construction. Swivel casters or any type wheels can be mounted. Should a stationary

lift be desired, wheels are removed and a platform placed on the cross arm. Overall width and length are 4 and 11 feet, respectively, and capacities offered are 500, 2000, 4000 and 6000 pounds.

Check No. 5 on Reply Card for more Details

High Thrust Collet Chuck

Developing a thrust 10 times the operating air line pressure is the heavy-duty BZC-10 controlled-air-power collet chuck introduced by Bellows Co., 222 W. Market St., Akron



9, O. Holding power is sufficient to withstand severe types of drilling, tapping and milling without the part or work piece slipping or twisting in the collet. An almost universal chuck, it will handle most standard collets with stock clearances up to 1⅝ inches. With an optional adaptor unit it will handle almost any standard externally-threaded draw type collet.

Unit is designed with a "dead man" safety control so that in the event of air pressure failure, it will hold securely; air pressure must be applied before the work can be released. Mounting may be in any position. Ample chip clearance is provided at the base.

Check No. 6 on Reply Card for more Details

Greater Capacity Bridge Crane

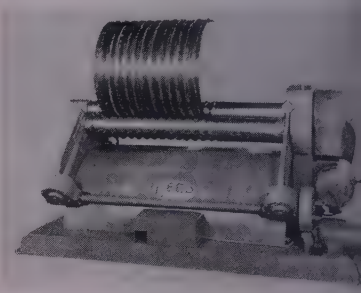
Greater hook load capacity is obtained through reduction of dead weight and improved wheel, track and bearing design of crane end truck and hoist trolley wheels incorporated in the Tramrail crane of floating suspension design, announced by Forker Corp., Cleveland 6, O. Use of swiveling crane end trucks and flexibly suspended runways eliminate the possibility of binding. Further ease of operation is obtained by length of end truck wheelbase which is selected so that the bridge span will not exceed eight times the end truck wheelbase.

Maximum headroom is obtained through use of underslung, single-girder bridge construction. [illegible] truck and trolley wheels are of hi strength cast iron with deep-chi tread and flange.

Check No. 7 on Reply Card for more De

Adjustable Corrugation Rolls

Equipped with three corruga shafts which can be designed to any standard type of corrugati the series 600 corrugated roll [illegible] chine introduced by Reed Engine



ing Co., 1003 West Fairview A Carthage, Mo., will roll sheets wh have previously been corrugated i circular and semicircular forms. is equipped with power adjustm on the rear forming roll which tablishes the curvature of the sh

An air-operated drop end pern

STEEL

Giant Tuna Clippers built by Avondale

IS THE HEART OF

Giant Dredges built by Avondale

SHIPBUILDING & REPAIRING

Avondale Marine Ways, INC.

MAIN PLANT: AVONDALE, LA. QUICK REPAIR PLANT: HARVEY, LA.

Location of the Aluminum Alloy Division, Vanadium Corporation of America, near Chester, Pa. Leased from War Assets Administration.

NEW SOURCE OF ALUMINUM-RICH ALLOYS
FOR THE ALUMINUM AND STEEL INDUSTRIES

ur Aluminum Alloy Division, with headquarters Chester, Pa., has begun commercial production aluminum-rich alloys to serve the aluminum industry and to supplement the deoxidizers we have supplied for many years to the steel industry. The grades and compositions offered are:

FOR STEEL

Grade 1 . . . . . 95 to 97% Aluminum
Grade 2 . . . . . 92 to 95% Aluminum
Grade 3 . . . . . 90 to 92% Aluminum
Grade 4 . . . . . 85 to 90% Aluminum

Ingots, notch bars, shot, grain and special shapes —for deoxidation and grain size control.

FOR ALUMINUM

Vanadium-Aluminum . . . . . 2½, 5 and 10% V
Titanium-Aluminum . . . . . 2½ and 5% Ti
Silicon-Aluminum . . . . . 5 to 20% Si

For alloying, for grain refinement, and for improving the mechanical properties and fabricating qualities of numerous aluminum alloys.

areful supervision of manufacture in the largest ectric furnace ever built for the melting of aluminum, combined with close spectrographic control, assures quantity production of quality material.

Write us for details as to how these products can serve you

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why starve your automatics...

FOLLANSBEE COLD ROLLED STRIP feeds right from the coil into your automatic machines. There's real efficiency and time-saving economy in the continuous supply of presses, roll-formers, and other automatics. These high-speed machines need never starve for material because you can feed Follansbee Cold Rolled Strip directly from the coil.

making gadgets for gourmets?

FOLLANSBEE COLD ROLLED STRIP is manufactured in a range of tempers, and with the proper finish, for making turners, mixers, beaters, and a myriad other profitable specialties. Custom-made Follansbee Cold Rolled Strip, in continuous coils, is furnished to your specifications. You should be taking advantage of the machining quality of Follansbee Cold Rolled Strip and Follansbee Polished Blue Strip. Just call the Follansbee Steel Representative nearest you.

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SEAMLESS TERNE ROLL ROOFING
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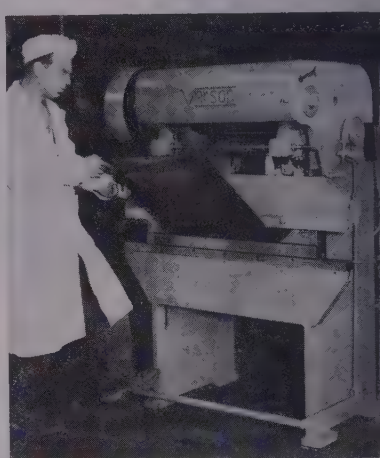
Follansbee Metal Warehouses — Pittsburgh, Pa., Rochester, N. Y., and Fairfield, Conn.

quick removal of fully rolled circle Top shaft automatically raises whe the drop end is lowered for the r moval of such work. Equipped wi bronze bearings throughout, the m chine has a totally enclosed sile worm gear drive. Main driving m tor is 5 hp and auxiliary motor f adjusting rear roll is 1½ hp.

Check No. 8 on Reply Card for more Deta

Small Power Press Brake

Suitable for most types of met forming operations is the power pre brake with bed and ram length of inches, offered by Verson Allste Press Co., 9318 S. Kenwood Av Chicago 19, Ill. Rated air bendi capacities range from 48-inch lengt



of 16 gage stock, over a ½-in opening, to 24-inch length of gage stock, over a 1⅛-inch openi

Unit all steel construction is e ployed in the model 16-48 unit assure perfect alignment and ma mum rigidity. All gears are st with machine cut teeth. A tota enclosed friction clutch and self- leasing band brake are employe Eccentric and intermediate shafts a mounted in solid renewable bron bushings. Variable speed arrang ment provides for 20 to 50 strok per minute. The press may be mou ed on casters.

Check No. 9 on Reply Card for more Det

Presses for Varied Operations

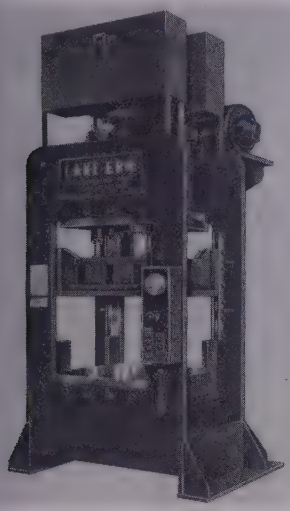
Offered in capacities of 100, and 200 tons, series DF standard h draulic metalworking presses, bu by Lake Erie Engineering Corp., B falo 17, N. Y., may be adapted drawing, forming, straighteni bending, coining, and various ot shop operations.

Available with or without cushi presses, in each of the tonnag can be furnished in four combi tions: Single-action normal-spe with hand-lever operation; single- tion with cushion, normal-spe

nd-lever operation; single-action th high-speed pushbutton operaon; single-action with cushion, high eed pushbutton operation.

Operation is governed by the pres-re-control hand wheel, operating er, motor controls, and a hydraulic ge mounted on the instrument pan-

Both the main cylinder and pull-

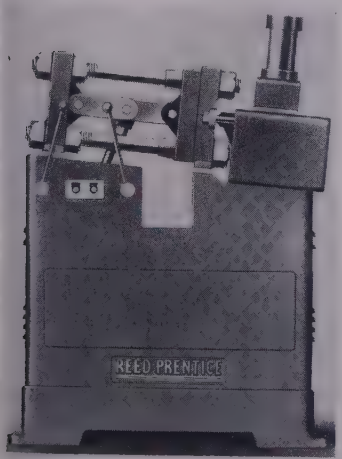


ck cylinders are single-action de-gned. Moving platen is guided ainst steel tension plates by ad-stable gibs. Main ram is cast from ecial grade close-grained cast iron, en is machined, rolled, and polished.

eck No. 10 on Reply Card for more Details

ie Casting Machine

Having a maximum shot capacity 1 pound of zinc, the model No. O lf-contained die casting machine, ade by Reed-Prentice Corp. of Wor-ster 4, Mass., is capable of pro-

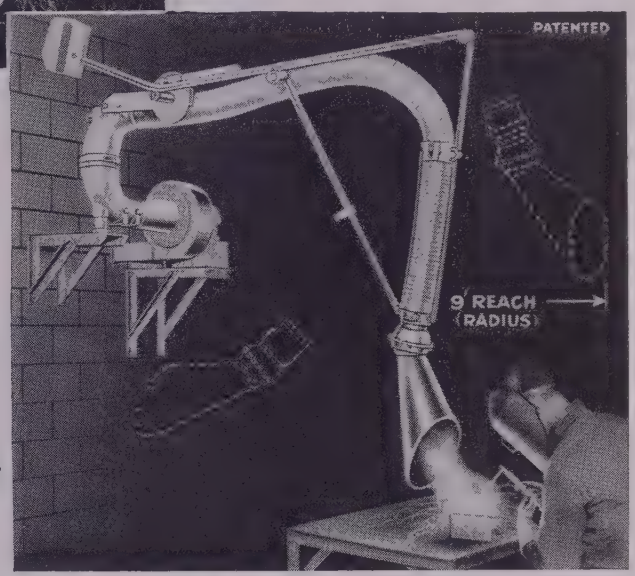


cing up to 600 shots per hour. ich small pieces as knobs, handles, ars and fittings may be cast of ad, tin or zinc base alloys.

Machine is manually operated by draulic pilot valve control levers.

RUEMELIN Welding Fume Collector

Welding without ventilating snout. Note smoke clouds and poor vision. Gases and heat surround operator's helmet.



Collecting Welding Fumes with a Ruemelin Fume Collector.

REMOVES WELDING FUMES *at the Source!*

Solve your welding fume problem efficiently by installing Ruemelin Welding Fume Collectors. They produce a powerful suction that removes smoke, gas and heat at the source. Guards employee health, resulting in less welder fatigue. Clears shop air with minimum heat loss. Covers maximum welding area vertically, horizontally and by circle swing. Made in 9 ft. and 15 ft. reach sizes. Shipped assembled, easy to install. Thousands in practical service. Free engineering service for your installation.

Write for our New Bulletin 37-D and list of users — just off the press.

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3882 NORTH PALMER STREET • MILWAUKEE 12, WISCONSIN, U. S. A.

MANUFACTURERS AND ENGINEERS • SAND BLAST AND DUST COLLECTING EQUIPMENT • WELDING FUME COLLECTORS

A 5580-2/3A

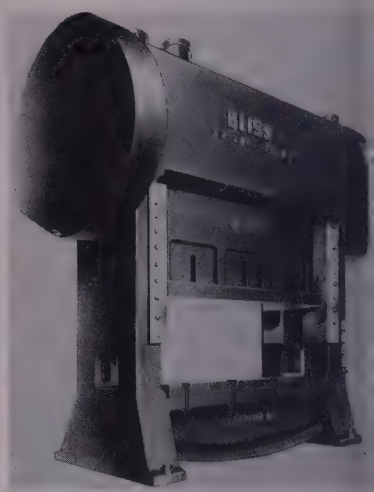
Maximum casting area at 1300 psi is 9 square inches with adequate casting area provided by die plates measuring 10 x 10 inches. Holding pot has a capacity of 75 pounds of zinc.

Check No. 11 on Reply Card for more Details

Multi-Operation Presses

Used for such operations as blanking, cutting, punching, shaping, stamping, embossing and drawing and drawing and forming work are new lines of straight side single and double crane presses developed by E. W. Bliss Co., Toledo, O. Conforming to Joint Industry Conference standards, they have tonnage and weight capacities and bed and slide areas which are slightly larger. Box-type crowns and slides are reinforced by deep internal ribs.

Barrel type slide adjustment permits long adjustment to accommodate dies varying greatly in height. All press frames are of the four-piece tie rod construction and are of Meehanite castings. Slides and gibs are longer for precision guiding of die into work. Single end drive presses with capacities up to and including 250 tons have a new type of pneumatic friction clutch mount on the crankshaft. Power adju

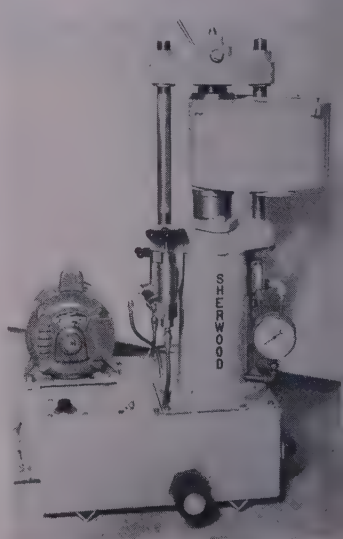


ment of slide is standard equipme on all presses.

Check No. 12 on Reply Card for more Det

Production Wax Injection Pre

For volume production of w patterns for industrial precision ca ings is the Sherwood heavy-duty w injection press offered by Alexan Saunders & Co., New York, N. Wax is extruded by direct pist



drive activated by a hydraulic pur Wax pressure may vary from 100 1500 psi. The wax is contained cylinders carried in a revolving dru while the wax is being discharg from one cylinder, it is being te pered for future use in the ot cylinders.

Revolving drum may contain f or five wax cylinders. Electric st heaters in a 10-gallon oil tank h the wax. Temperature is control to within 2° F plus or minus. Ra is to 400° F. For low pressure wo

Your confidence in a stamping source is an item we can't buy—but *we can earn* it! You see, buyers of small to medium-large stampings across the nation have *solid reasons* for the trust they place in us—and we invite you to join this distinguished clientel. If your products require coining, as well as blanking, piercing, forming, drawing—or close tolerances—or are suitable for automatic or progressive press operations—we're sure you'll profit from an association in which you find

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- **Broad experience, including extensive tool-engineering "know-how"**
- **Wide scope of production from a modern plant and equipment**
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Our new booklet "Stampings", describes our plant, over 75 presses and other equipment and the range of our production. Please write for your copy and the name of our Stampings Sales Representative in your area.

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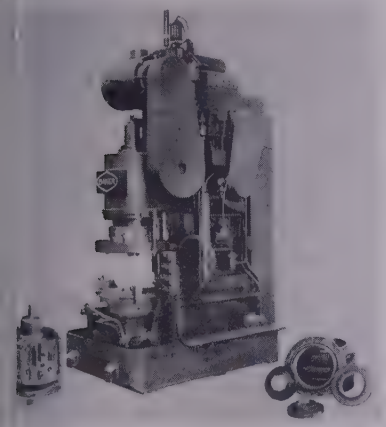
Manufacturers of famous De-Sta-Co Toggle Clamps, Arbor Spacers, Shims, Shim Stock, Blower Housings, Refrigerator Compressor Valves.

die may be held manually against nozzle. Clamps or press arrangements can be made to lock the die in ition for injection.

ck No. 13 on Reply Card for more Details

s Pipe Flange Productivity

Operating time in boring, reaming, eading and counterboring cast iron e flanges is reduced by the num- 30H04 machine developed by ker Brothers Inc., Toledo, O. It equipped with a 3-jaw scroll and ck and will handle all size flanges m 3 to 16-inch pipe size. Murchey cial full receding pipe taps with



ick-change chasers and reamer ades perform the operations in rap- succession. A worm and worm ar drive head is arranged with slid- gears to provide two speeds plus k-off speed change gears.

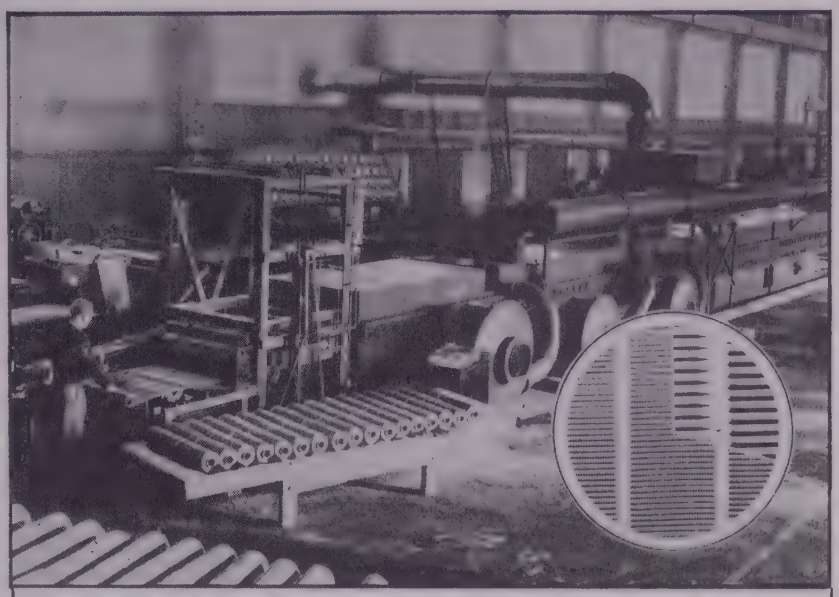
In operation the saddle rapidly adnces through hydraulic feed pressre to a predetermined point where ber reaming operation begins. A lf nut closes, providing lead screw d of saddle for reaming, tapping d counterboring operation. At comtion of operations, the half nut ens and the saddle is rapidly rened to raised position by hydraulic ssure.

ck No. 14 on Reply Card for more Details

lity Storage Boxes

Utility storage boxes of the type lt by North American Industries ., 2100 N. Kolmar Ave., Chicago Ill., may be handled by fork lift tors as well as by overhead cranes d hand-operated pallet bed trucks. its have four-side utility with ck lifting forks, strong bottom nstruction, self-positioning stacking gs, four corner lifting hooks and cu ft capacity. Construction is 12-gage hard temper steel with a:-welded joints.

Typical uses are in the storing and gregation of materials, as furnace harging boxes with rotating fork



The Alodizing installation at Permanente's Trentwood, Washington plant. Kaiser Aluminum Shade Screening (shown in inset) excludes insects and, venetian-blind-wise, deflects the rays of the sun thus reducing room temperatures as much as 15° F. without interfering with air circulation.

This screening is produced by the Permanente Metals Corporation and sold by Permanente Products Company to screen manufacturers, distributors and dealers throughout the nation.

Alodized* **ALUMINUM**

provides

Kaiser Aluminum SHADE SCREENING

WITH MAXIMUM PROTECTION

Kaiser's new departure in screening, shown above, utilizes "Alodine"—the new development in metal protection. "Alodine" greatly increases the natural weather resistance of aluminum and reduces reflectivity by masking aluminum's metallic luster with a pleasing shade of green.

Alodizing is a purely chemical process—not an electrolytic one—and involves no elaborate apparatus. The coating solution is applied rapidly, uniformly and at low cost. Spray, dip, and even brush processes make Alodizing available to all kinds of installations; and manufacturers of aluminum are Alodizing on a huge scale at their mills to supply Alodized sheets and coils to plants lacking facilities for treating the metal.

"Alodine" promotes economy in production; and protects the quality of finished aluminum products. Insist on Alodizing and Alodized aluminum in your own fabrication. Write to us for further information on "Alodine".

* "Alodine" Trade Mark Reg U. S. Pat. Off. by The American Chemical Paint Company.

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lift tractors, for storage and shipment of castings and machined parts and interplant storage and shipment of turnings, borings, chips, etc.

Check No. 15 on Reply Card for more Details

• • •

PERFORMS SOLDERING OPERATIONS: Superheat gun grip alcohol Blotorch, announced by Lenk Mfg. Co., Boston 15, Mass., will produce a flame of over 2700° F. This enables it to perform silver soldering, brazing and sweat fitting work as well as soft soldering operations. A built-in safety stand enables torch to be set in various positions on a work bench.

Check No. 16 on Reply Card for more Details

CONTROL VALVE: Quick reversibility of action is a feature of the Stabilflo valve offered by Foxboro Co., Foxboro, Mass. In a few minutes and without the use of special tools, valve can be changed from air to open to air to close, or vice versa. It is not necessary to remove it from its installation or shut down controlled flow.

Check No. 17 on Reply Card for more Details

FOR CONTROL USE: Ward Leonard Electric Co., Mount Vernon, N. Y., announces Bulletin 110 multipole Midget magnetic relays designed for general and special purpose control use. Typical applications include machine tool, alarm, heater, etc.

Check No. 18 on Reply Card for more Details

WELDS STAINLESS: Sureweld portable spot welder, introduced by National Cylinder Gas Co., Chicago 11, Ill., will weld stainless and mild steel up to 1/8-inch combined thickness. It operates on 220 v ac lines, single phase, 50/60 cycle.

Check No. 19 on Reply Card for more Details

LOAD BINDER: For easy and safe binding of heavy industrial loads on trucks and trailers, American Forge & Mfg. Co., Pittsburgh 12, Pa., introduces a new ratchet-type load binder. Weighing 13 pounds with a barrel length of 10 inches, it has a full 8-inch takeup, allowing load to be retightened at any time enroute without having to release tension or readjust chain.

Check No. 20 on Reply Card for more Details

CLAMP: Hunter Spring Co., Lansdale, Pa., announces the Neg'ator clamp that features automatic takeup, constant clamping pressure regardless of thickness of object held, enormous dimensional range between clamp heads, flexibility in locating clamping pressure and coil form head or jaws. It is offered in standard sizes that cover a range of clamping pressures from 2 ounces to 20 pounds in eight increments.

Check No. 21 on Reply Card for more Details

ADJUSTABLE ON THE JOB: A line of fractional and small horsepower clutches is announced by Centric Clutch Co., Cranford, N. J. Each clutch is adjustable by the user right on the job. Pulley type clutches can accommodate several standard sizes of pulleys.

Check No. 22 on Reply Card for more Details

POWER-SAVING TREAD: A new line of aluminum core rubber tread industrial wheels in 6, 8 and 12-inch sizes are introduced by Bassick Co., Bridgeport, Conn. Called Alcore, they have a highly resilient power-saving rubber compound tread.

Check No. 23 on Reply Card for more Details

PORTABLE ELECTRIC DRILL: Fasco Industries Inc., Rochester, N. Y., offers a portable electric drill with a rated capacity up to ¼-inch in steel and ½-inch in wood. Universal motor operates on 110-120 v, ac or dc, 1600 rpm no load speed.

Check No. 24 on Reply Card for more Details

REPAIRS SILICA BRICK: General Refractories Co., Philadelphia, Pa., offers a new mortar, Grefco Silbrik Bond, for use in construction with silica brick and for repairs to all silica brick construction, particularly in open hearth, electric furnaces and in glass tanks.

Check No. 25 on Reply Card for more Details

TOOL HOLDER: Known as Redy Rigid, tool holder clamps carbide bit against work surface with maximum rigidity by a lock block, screw and lock nut arrangement which will not work loose. Developed by American Die & Tool Co., Reading, Pa., it is available for round, square, rectangular and triangular bits of all standard sizes.

Check No. 26 on Reply Card for more Details

CLEANER: Enthone Inc., New Haven, Conn., has developed a new type surface preparational material called Surprep for cleaning surfaces prior to organic finishing. It may be used full strength or diluted with water and applied by brushing or wiping. It contains oil-displacing chemicals and phosphating and other rust removing chemicals.

Check No. 27 on Reply Card for more Details

STRAIN INDICATOR: A new SR-4 self-balancing, dial type strain indicator for use in stress analysis with SR-4 bonded resistance wire st gages is announced by Baldwin L motive Works, Pittsburgh 19, Pa. may be used with single strain g or with multipoint switching and ancing units for reading strain poi Available with any one of t ranges, with any two, or with three ranges.

Check No. 28 on Reply Card for more D

WELDER CONTACTOR: Size 50 amp welder contactor was desig by Square D Co., Milwaukee 12, W for small spot welding machines to 10 kva, 220 v, or 20 kva at 44 Two double break contacts conne in series assure high rupturing ca city.

Check No. 29 on Reply Card for more D

NO LUBRICATION NEEDE Fitted with oil-impregnated por bronze bushing, a new flange t pillow block is announced by Pr sion Products Division, Atlanta T Co., Atlanta, Ga. Block will run definitely without lubrication or drip. It is available in shaft di eters from ½ to 1¼ inches.

Check No. 30 on Reply Card for more D

SAFETY SWITCH: Designed for in high capacity industrial distri tion systems, the type A HCI sw made by Trumbull Electric Mfg. Plainville, Conn., has a new quenching design and actuating chanism. It is made in 30, 60 100 amp sizes.

Check No. 31 on Reply Card for more D

CUTTING TOOLS: Designated Lucky 13, a new series of cut tools is offered by Plew Tool & M Heat Treat, Columbia City, Ind. and blades have a hardness C 66-68 and a tensile strength over 300,000 psi.

Check No. 32 on Reply Card for more D

MANUALLY OPERATED STA ERS: A new line of starters for ternating current motors up to hp is announced by General Electr Control Divisions, Schenectady 5 Y. Designed for use on small pur blowers and grinders, it is furnis in both toggle and pushbutton ty in 2, 3 and 4-pole forms, size 0 an

Check No. 33 on Reply Card for more D

FOR MORE INFORMATI
on the new products and equipm in this section, fill in a c It will receive prompt attent

Helpful Literature

Centrifugal Pumps

uffalo Pumps, Inc.—24-page illus-ed bulletin No. 955-N is descrip- of improved line of double-suction le-stage centrifugal pumps which built in capacities from 10 to 00 gpm. Pumps are designed for ct connection to motors and tur- s but can be furnished for belt e also.

Coil Weight Calculator

llansbee Steel Corp. — Circular et-size strip weight calculator nits rapid computations of pounds inch width of coil stock from in- and outside diameters and de- ines lineal feet per coil for any e thickness desired. Chart on rse side lists thicknesses and ght per square foot in pounds numerical gages of cold rolled steel.

Tumbling Barrels

rederick Gumm Chemical Co. — rel tumbling manual includes bas- information on barrel finishing, erous practical instructions and gestions, and specific data on de- ring with metallic and nonmetallic lia. Information is presented on nishing and on calculation of bar- sizes, void space volume and other ors.

Electric Controls

letropolitan Electric Mfg. Co.— age illustrated form is descriptive Lo-Ohm dead front switchboards, elboards and enclosed switches. tch features air vented contacts ly accessible for inspection, in- ting arc snuffers and abundant ing space. Panel and switchboards constructed of standardized switch s each housed in individual steel losure with its own safety in- ocked cover. All are listed by lerwriters' Laboratories.

Pneumatic Agitators

clipse Air Brush Co.—28-page il- rated catalog "Pneumix in Ac- n" portrays air-powered explosion- of agitators for laboratory and duction use. Publication lists ap- ations, shows 17 typical installa- s in wide variety of industries, gives details of eleven types of ustable speed agitators. Formula ncluded for selecting correct agi- or for any mixing job.

Materials Handling Units

age Equipment Co.—4-page illus- ed pamphlet "Sage, the Finest Materials Handling Equipment" ws and describes gravity wheel roller, live roller, slat or chain floor-to-floor conveyors; portable boosters; sorting tables; belt veyor tables for assembly work; h waiters and hand trucks.

80. Ice & Snow Thawing

Chem Industrial Co. — Illustrated technical data bulletin on Melt, ice and snow thawing chemical powder, contains application directions for use of product on loading docks, driveways, steps and parking lots and for thawing frozen gutters, sewers and railway switches.

81. Air-Cooled Transformers

Acme Electric Corp. — Illustrated catalog AC 178 provides detailed specifications on air-cooled transformers from 1/10 to 50 kva and includes wiring diagrams showing how these transformers can be used to eliminate independent wiring for power and light, for distribution of power at high voltage and for operation of 115-v equipment from power circuits. Chart shows simple methods of using single-phase transformers in three-phase hookups.

82. Special Cutting Tools

J & S Tool Co.—4-page illustrated folder depicts form-grinding to customer's specifications of special high speed steel and carbide tools. Included are wheel dressers, size dressers, jaw clamps, Koala circular turning and boring tools, and vise jaws.

83. Wire Marker

E-Z Code Div., Western Lithograph Co.—12-page illustrated bulletin No. 349 discusses advantages of E-Z Code self-adhesive wire markers; special markers; Flag-It and Spot-It markers; markers for computing piecework; and CCP markers for pipe, cable and conduit.

84. Fastening Specialties

South Chester Corp.—28-page illustrated manual is entitled "Fastening Specialties Handbook." Descriptive and engineering data are presented on Southco blind rivets, anchor nuts, panel fasteners, door-retaining springs and other specialties for fastening metal to metal or to wood.

85. High Temperature Alloys

Kennametal, Inc.—4-page illustrated leaflet No. 255 outlines physical properties of K138 and K138A compositions which are essentially titanium carbide and cobalt. Compositions are usable for applications at temperatures and conditions at which tool grades oxidize rapidly. Materials withstand temperatures over 2500° F, are resistant to thermal shock and have good fatigue strength.

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10	30	50	70	90
11	31	51	71	91
12	32	52	72	92
13	33	53	73	93
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17	37	57	77	97
18	38	58	78	98
19	39	59	79	99
20	40	60	80	100

STEEL 11-7-49
Penton Building, Cleveland 13, Ohio

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86. Metal Cleaner

Diversey Corp., Metal Industries Dept. — 4-page illustrated file-size folder enumerates features of No. 909 heavy duty soak tank metal cleaner, its applications and directions for use.

87. Scrap Handling Equipment

Harnischfeger Corp.—4-page illustrated bulletin X-121 deals with various kinds of equipment for handling scrap. Depicted are overhead, truck and crawler cranes equipped with magnet, bucket and slings in all types of scrap handling service.

88. Roof Ventilators

Burt Mfg. Co.—12-page illustrated publication form No. SPV-101-C presents description, performance and dimension data, and drawings of continuous ridge, gravity, ball-bearing revolving and fan ventilators; ventilator dampers and controls; ventilator bases and wall louvers.

89. Bearings & Castings

American Brake Shoe Co., National Bearing Div. — 28-page illustrated brochure entitled "Bronze and Copper Bearings and Castings" describes scope of research, engineering and production facilities for supplying bronze or copper castings or bearings as well as cored and solid bar stock.

90. Speed Reducers

Euclid Universal Machine, Inc.—28-page illustrated catalog No. 202 is guide to line of speed reducers of single and double reduction, miter and special type. Features, specifications, dimensions and prices for complete line are given.

91. Hydraulic Tubing

Superior Tube Co.—4-page illustrated bulletin No. 38 gives general and technical information as well as specifications on line of seamless steel hydraulic tubing from ⅛ to 1⅛-in. OD, in wall thicknesses for every practical operating pressure.

92. Ball Bearings

Marlin-Rockwell Corp.—4-page illustrated folder "The M-R-C 'Synthe-Seal' Bearing" presents data on standard-dimension ball bearing which incorporates removable synthetic rubber seal having steel core to keep out dirt, grit and moisture.

93. Centralized Lubrication

Trabon Engineering Corp.—4-page illustrated bulletin 484 deals with type M centralized lubrication system for machinery of all types. Positive piston displacement assures that each bearing receives predetermined measured amount of oil or grease.

94. Aluminum Cleaner

Enthone, Inc.—1-page leaflet "thone Aluminum Cleaner E" cusses etching-type alkaline cle for aluminum. Cleaner is used produce fine etched finish on alu num as well as to prepare it painting and electroplating. Publ tion devotes space to concentrat smut formation and control.

95. Blast Cleaning Machine

American Wheelabrator & Eq ment Corp.—4-page illustrated bu tin No. 144-A explains construc and specifications of redesigned x 72-in. Wheelabrator Tumblast less abrasive blast cleaning mach Machine has operating load capa of 30 cu ft and is built for handl large heavy blast cleaning jobs.

96. Drilling & Tapping Units

Govro-Nelson Co.—8-page illust ed brochure "Govro-Nelson Autom Drilling and Tapping Units" prese detailed information on drilling u which incorporate simple centrifu feeding device with full hydra control. Exterior adjustments provided for rapid approach, rate feed and length of stroke.

97. Push Broaches & Adapte

Kase Machine Co.—Illustrated letin No. 12 describes line of Gle push broaches and eccentric adapt presents operating and enginee data, and lists prices. Specificati as to diameter, overall length, in changeable cutting blade width length, and number of teeth per bl are given for 32 standard sizes.

98. Production Machining

Carey Machine Co.—4-page il trated catalog "Fast—Accurate P duction Machining" describes fa ties for producing wide variety parts, including precision finish and complete assembly. Product operations are illustrated and ty of machine tools listed.

99. Inspection Instruments

Buhl Optical Co.—Illustrated d sheets describe S-129 40 to 60-p er pocket microscope, S-152 power Handi-scope and S-42 Ma prox desk magnifier optical ins tion instruments. Specifications, pr and operating instructions are cluded in description of each ins ment.

100. Thread Milling Cutters

Pratt & Whitney Div., Niles-ment-Pond Co.—4-page circular 522 contains specifications, sizes prices of thread milling cutters Pratt & Whitney thread milling chines. Cutters are furnished cutting National, V, Acme or w thread forms. Space is devoted to multiple thread milling cutt with both cut and ground thr

FOR MORE INFORMATION USE ONE OF THESE CARDS . .

STEEL Numbers				
1	21	41	61	81
2	22	42	62	82
3	23	43	63	83
4	24	44	64	84
5	25	45	65	85
6	26	46	66	86
7	27	47	67	87
8	28	48	68	88
9	29	49	69	89
10	30	50	70	90
11	31	51	71	91
12	32	52	72	92
13	33	53	73	93
14	34	54	74	94
15	35	55	75	95
16	36	56	76	96
17	37	57	77	97
18	38	58	78	98
19	39	59	79	99
20	40	60	80	100

STEEL 11-7-49

Penton Building, Cleveland 13, Ohio

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Market Summary

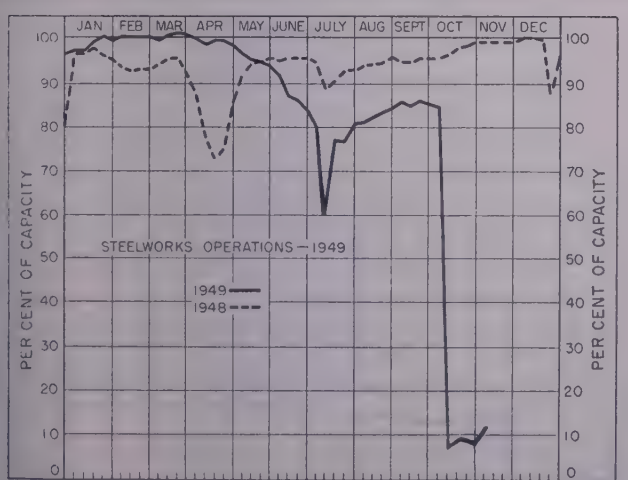
SCARCITY STEEL market, especially in flat-rolled products, looms for the next five to six months. Metalworking shops' inventories are depleted, or so badly unbalanced, it will take that long to restore full supply-demand equilibrium after the strike ends. Probably 9 million tons of ingot production will be lost from 1949 output by the work stoppage. Complicating the outlook is the coal strike. Lacking assurance of adequate fuel supply, some steelworks may not promptly resume operations upon strike termination. Extensive furnace repairs also may be a stumbling-block to quick snap-back to pre-strike levels. This will serve to intensify tight supply conditions. Indicative of the seriousness of the outlook, some automotive companies already are nibbling at the conversion market for stop-gap tonnage.

LABOR—While the steel strike is heading into its closing stages, some time may elapse before complete settlement. Much depends on union policy with the separate producers. Optimism in steel and metalworking is checked by the fact the Bethlehem agreement, which the union seeks to make standard, may be difficult for many companies, especially the smaller ones with limited resources and lacking pension plan experience. Consequently, settlements may lag in a number of instances.

PRODUCTION—Speed with which steelmaking operations are restored to pre-strike levels, 86 per cent of capacity, depends upon time required for actual settlements with the separate producers; physical state of steelmaking equipment; adequacy of fuel and furnace repair supplies. Raw materials in general, scrap, ore, limestone, are adequate. Some steelworks and blast furnaces can resume quickly once the go-ahead signal is given. Bethlehem Steel will be back to pre-strike levels at some plants by mid-week, about 10 days after it settled. Rotary Electric Steel Co. got back into production within one day after it signed up. Generally, resumption time will vary among producing units and it is unlikely normal operations can be regained until several weeks after the strike.

OPERATIONS—Steelmaking picked up last week following Bethlehem's settlement, the estimated national ingot rate rising 3 points to 12 per cent of capacity. District rates rose 21½ points to 30 per cent in eastern Pennsylvania. 11½ points to 91.5 in St. Louis, and 6 points to 52 in Cincinnati. The Pittsburgh rate eased 1½ points to 2, reflecting addition of one producer to the list of strike-idled. Steady gain in the rate is anticipated in step with completion of separate pension agreements. Meanwhile, metalworking is jolted severely by the steel shortage. Some plants are on curtailed schedules and further cutbacks are in prospect. Steel is not likely to begin flowing from the mills in sufficient volume in time to prevent projected metalworking curtailments.

PRICES—Naturally, with steelmaking costs in for another upward nudge prices are being watched closely. Whether the increased costs will be passed along to consumers in higher prices is a moot question, however. There is yet no sign a general increase is on the way, although producers expect the pension-insurance settlement to raise costs $4 a ton. Premium-priced material is appearing in the market and high-priced conversion deals are in the making so that some increase in steel costs to consumers is certain. Scrap prices advanced on a broad front last week, largely reflecting stronger broker-dealer sentiment. STEEL's composite for steelmaking grades advanced to $28 from $26.67 the week preceding. Pig iron composites held unchanged as follows: Basic, $45.60; No. 2 foundry, $46.10; malleable, $47.27. Finished steel arithmetical composite held steady at $91.64, as did STEEL's weighted finished steel index at 152.52.



DISTRICT STEEL RATES

Percentage of Ingot Capacity Engaged in Leading Districts

	Week Ended Nov. 5	Change	Same Week 1948	Same Week 1947
Pittsburgh	2	— 1.5	96	101
Chicago	5.5	— 0.5*	99	94.5
Eastern Pa.	30	+21.5	95	93.5
Youngstown	0	None	105	92
Wheeling	61	None	91	86
Cleveland	0	None	99.5	90.5
Buffalo	0	None	104	88.5
Birmingham	6	None	100	99
New England	58	None	90	86
Cincinnati	52	+ 6	106	91
St. Louis	91.5	+11.5	89.5	80
Detroit	37	None	100	89
Western	21.5	None	..	..
Estimated national rate	12	+ 3	99	96

Based on weekly steelmaking capacity of 1,843,516 net tons for 1949; 1,802,476 net tons for 1948; 1,749,928 tons for 1947. *Change from revised rate.

Composite Market Averages

	Nov. 3 1949	Week Ago	Month Ago	Year Ago	5 Yrs. Ago
FINISHED STEEL INDEX, Weighted:					
Index (1935-39 av.=100)	152.52	152.52	152.52	151.86	99.16
Index in cents per lb ..	4.132	4.132	4.132	4.114	2.686
ARITHMETICAL PRICE COMPOSITES:					
Finished Steel, NT	$91.64	$91.64	$91.55	$95.05	$56.73
No. 2 Fdry Pig Iron, GT	46.10	46.10	46.10	46.69	23.67
Malleable Pig Iron, GT..	47.27	47.27	47.27	47.41	24.29
Basic Pig Iron, GT.....	45.60	45.60	45.60	46.29	23.00
Steelmaking Scrap, GT..	28.00	26.67	27.58	43.25	16.00

Weighted finished steel index based on average shipments and prices of the following 14 representative products during 5-year base period 1935-39: Structural shapes, plates, rails, hot-rolled and cold-finished bars, pipe, wire, nails, tin plate, hot and cold-rolled sheets, galvanized sheets, hot and cold-rolled strip. For complete explanation see STEEL, Sept. 19, 1949, p. 54.

Arithmetical steel price composite based on same products as the weighted finished steel index with the exception of rails, cold-finished bars, galvanized sheets and hot-rolled strip.

Basic and No. 2 foundry pig iron composites are based on average prices at Pittsburgh, Bethlehem, Birmingham, Buffalo, Chicago, Cleveland, Granite City, Youngstown. Malleable composite based on same points, except Birmingham.

Steelmaking scrap composite based on average prices of No. 1 heavy melting steel at Pittsburgh, Chicago and Philadelphia.

Comparison of Prices

Comparative prices by districts, in cents per pound except as otherwise noted. Delivered prices based on nearest production point.

FINISHED MATERIALS

	Nov. 3 1949	Week Ago	Month Ago	Year Ago	5 Yrs. Ago
Bars, H.R., Pittsburgh ...	3.35	3.35	3.35	3.35–55	2.15
Bars, H.R., del. Phila. ...	3.83	3.83	3.83	3.79	2.47
Bars, H.R., Chicago	3.35	3.35	3.35	3.35	2.15
Bars, C. F., Pittsburgh	3.95-4.00	3.95-4.00	3.95-4.00	3.95-4.25	2.65
Bars, C.F., Chicago	4.00	4.00	4.00	4.00	2.65
Shapes, Std., Pittsburgh ..	3.25	3.25	3.25	3.25–30	2.10
Shapes, Std., Chicago	3.25	3.25	3.25	3.25	2.10
Shapes, del. Phila.	3.50	3.50	3.50	3.48	2.215
Plates, Pittsburgh	3.40	3.40	3.40	3.40–60	2.10
Plates, Chicago	3.40	3.40	3.40	3.40	2.10
Plates, Coatesville, Pa....	3.50	3.50	3.50	3.75	2.10
Plates, Sparrows Point, Md.	3.40	3.40	3.40	3.45	2.10
Plates, Claymont, Del.	3.50	3.50	3.50	3.95	2.10
Plates, del. Phila.	3.59	3.59	3.59	3.71	2.15
Sheets, H.R., Pittsburgh ..	3.25	3.25	3.25	3.25–30	2.10
Sheets, H.R., Chicago	3.25	3.25	3.25	3.25	2.10
Sheets, C.R., Pittsburgh ..	4.00	4.00	4.00	4.00	3.05
Sheets, C.R., Chicago	4.00	4.00	4.00	4.00	3.05
Sheets, C.R., Detroit	4.20	4.20	4.20	4.20	3.15
Sheets, Galv., Pittsburgh ..	4.40	4.40	4.40	4.40	3.50
Strip, H.R., Pittsburgh ...	3.25	3.25	3.25	3.25–70	2.10
Strip, H.R., Chicago	3.25	3.25	3.25	3.25–30	2.10
Strip, C.R., Pittsburgh ...	4.00	4.00	4.00	4.00–75	2.80
Strip, C.R., Chicago	4.00–15	4.00–15	4.00–15	4.00–25	2.90
Strip, C.R., Detroit	4.20–25	4.20–25	4.20–25	4.20–50	2.90
Wire, Basic, Pittsburgh ...	4.15	4.15	4.15	4.15-4.50	2.60
Nails, Wire, Pittsburgh ...	5.15	5.15	5.15	5.15-6.30	2.55
Tin plate, box, Pittsburgh.	$7.75	$7.75	$7.75	$6.70	$5.00

SEMIFINISHED

Billets, forging, Pitts.(NT)	$61.00	$61.00	$61.00	$61.00	$40.00
Sheet bar, mill(NT)	51.78–52.00	51.78–52.00	52.00–53.57	67.00	34.00
Wire rods, ⅞-⅝", Pitts. ..	3.40	3.40	3.40	3.40-4.15	2.00

PIG IRON, Gross Ton

Bessemer, Pitts.	$47.00	$47.00	$47.00	$47.00	$24.50
Basic, Valley	46.00	46.00	46.00	46.00	23.50
Basic, del. Phila.	49.44	49.44	49.44	50.17	25.34
No. 2 Fdry, Pitts.	46.50	46.50	46.50	46.50	24.00
No. 2 Fdry, Chicago	46.50	46.50	46.50	46.00-46.50	24.00
No. 2 Fdry, Valley	46.50	46.50	46.50	46.50	24.00
No. 2 Fdry, del. Phila. ...	49.94	49.94	49.94	50.67	25.84
No. 2 Fdry, Birmingham..	39.38	39.38	39.38	43.38	20.38
No. 2 Fdry.(Birm.)del Cin.	46.08	46.08	46.08	49.09	24.06
Malleable, Valley	46.50	46.50	46.50	46.50	24.00
Malleable, Chicago	46.50	46.50	46.50	46.50	24.00
Charcoal, Lyles, Tenn.	60.00	60.00	60.00	66.00	33.00
Ferromanganese, Etna, Pa.	175.00	175.00	175.00	163.00	135.00

SCRAP, Gross Ton

No. 1 Heavy Melt. Pitts. ..	$29.50	$29.00	$29.75	$42.75	$16.50
No. 1 Heavy Melt. E. Pa..	25.00	23.50	25.00	41.50	15.50
No. 1 Heavy Melt. Chicago	29.50	27.50	27.00	41.75	16.50
No. 1 Heavy Melt. Valley	29.25	29.25	31.25	42.75	16.25
No. 1 Heavy Melt. Cleve...	26.50	26.00	26.50	42.25	15.25
No. 1 Heavy Melt. Buffalo.	27.25	27.25	28.25	48.25	16.75
Rails, Rerolling, Chicago..	44.50	41.50	41.50	64.50	22.25
No. 1 Cast, Chicago	41.50	41.50	41.50	70.50	20.00

COKE, Gross Ton

Beehive, Furn., Connlsvl. .	$13.25	$13.25	$13.25	$14.50	$7.00
Beehive, Fdry., Connlsvl. .	15.75	15.75	15.75	17.00	7.75
Oven, Fdry, Chicago	20.00	20.00	20.00	20.40	13.35

NONFERROUS METALS

Copper, del. Conn.	17.62½-18.50	17.625	17.625	23.50	12.00
Zinc, E. St. Louis	9.75	9.50	9.25	15.50	8.25
Lead, St. Louis	12.80	12.80	14.05	21.30–35	6.35
Tin, New York	94.00	95.00	96.00	103.00	52.00
Aluminum, del.	17.00	17.00	17.00	17.00	15.00
Antimony, Laredo, Tex. ..	32.00	32.00	38.50	38.50	14.50
Nickel, refinery, duty paid	40.00	40.00	40.00	40.00	35.00

Pig Iron

For key to producing companies, turn next page.
Minimum delivered prices do not include 3% federal tax.

PIG IRON, Gross Ton	Basic	No. 2 Foundry	Malle-able	Bes me
Bethlehem,Pa. B2	$48.00	$48.50	$49.00	$49.
Newark,del.	50.63	51.13	51.63	52.
Brooklyn,N.Y.,del.	....	52.79	53.29	..
Birmingham District				
Birmingham,Ala. R2, S9	38.88	39.38	....	..
Woodward,Ala. W15	38.88	39.38	....	..
Cincinnati,del.	....	46.08	....	..
Buffalo District				
Buffalo H1, R2	46.00	46.50	47.00	..
Tonawanda,N.Y. W12	46.00	46.50	47.00	..
N.Tonawanda,N.Y. T9	....	46.50	47.00	..
Boston, del.	55.26	55.76	56.20	..
Rochester,N.Y.,del.	48.63	49.13	49.63	..
Syracuse,N.Y.,del.	49.58	50.08	50.58	..
Chicago District				
Chicago I-3	46.00	46.50	46.50	47.
Gary,Ind. C3	46.00	....	46.50	..
IndianaHarbor,Ind. I-2	46.00	....	46.50	..
So.Chicago,Ill. W14	46.00	46.50	46.50	..
So.Chicago,Ill. C3	46.00	....	46.50	47.
So.Chicago,Ill. Y1	46.00	46.50	46.50	..
Milwaukee,del.	47.89	48.39	48.39	48.
Muskegon,Mich.del.	....	51.98	51.98	..
Cleveland District				
Cleveland A7	46.00	46.50	46.50	47.
Cleveland R2	46.00	46.50	46.50	..
Akron, del. from Cleve.	48.39	48.89	48.89	49.
Lorain,O. N3	46.00	....	....	47.
Duluth I-3	....	....	46.50	..
Erie,Pa. I-3	46.00	46.50	46.50	47.
Everett,Mass. E1	....	50.50	51.00	..
Geneva,Utah G1	46.00	46.50	....	..
Seattle,Tacoma,Wash.,del.	....	54.20	....	..
Portland,Oreg., del.	....	54.20	....	..
LosAngeles,SanFrancisco,del. ...	53.70	54.20	....	..
GraniteCity,Ill. M10	47.90	48.40	48.90	..
St.Louis,del.(incl. tax)	48.65	49.15	49.65	..
Ironton,Utah C11	46.00	46.50	....	..
Minnequa,Colo. C10	47.00	47.50	47.50	..
Pittsburgh District				
NevilleIsland,Pa. P6	46.00	46.50	46.50	47.
Pitts.N.&S. sides,Ambridge, Aliquippa,del.	47.19	47.69	47.69	4
McKeesRocks,del.	46.95	47.45	47.45	47.
Lawrenceville,Homestead, McKeesport,Monaca,del.	47.44	47.94	47.94	48.
Verona,del.	47.90	48.40	48.40	48.
Brackenridge,del.	48.13	48.63	48.63	49.
Bessemer,Pa. C3	46.00	....	46.50	47.
Clairton,Rankin,So.Duquesne,Pa. C3	46.00	....	....	..
McKeesport,Pa. N3	46.00	....	....	47.
Sharpsville,Pa. S6	46.00	46.50	46.50	47.
Steelton,Pa. B2	48.00	48.50	49.00	49.
Steubenville,O. W10	46.00	....	....	..
Struthers,O. S16	46.00	....	....	..
Swedeland,Pa. A3	48.00	48.50	49.00	49.
Philadelphia,del.	49.44	49.94	50.44	50.
Toledo,O. I-3	46.00	46.50	46.50	47.
Cincinnati,del.	51.01	51.51	....	..
Troy,N.Y. R2	48.00	48.50	49.00	..
Youngstown District				
Hubbard,O. Y1	46.00	46.50	46.50	..
Youngstown C3	46.00	....	....	47.
Youngstown Y1	46.00	46.50	46.50	47.
Mansfield,O.,del.	50.26	50.76	50.76	51.

* Low phos, Southern grade.

PIG IRON DIFFERENTIALS

Silicon: Add 50 cents per ton for each 0.25% Si over base grade, 1 2.25%.
Phosphorous: Deduct 38 cents per ton for P content of 0.70% and o
Manganese: Add 50 cents per ton for each 0.50% manganese over or portion thereof.
Nickel: Under 0.50% no extra; 0.50-0.74%, incl., add $2 per ton each additional 0.25%, add $1 per ton.

BLAST FURNACE SILVERY PIG IRON, Gross Ton

(Base 6.00-6.50% silicon; Add $1 for each 0.5% Si to 11.50%

Jackson,O. J1, G2	$59.
Buffalo H1	60.

ELECTRIC FURNACE SILVERY PIG IRON, Gross Ton

(Base 14.01-14.50% silicon; add $1 for each 0.5% Si to 18%; $1 each 0.5% Mn over 1%; $1 for 0.045% max. P)

NiagaraFalls,N.Y. P15	$71.
Keokuk,Iowa, Openhearth & Fdry, frt. allowed K2.....	77.
Keokuk,Iowa, OH & Fdry, 12½ lb, piglets, frt. allowed K2..	82.
Wenatchee,Wash. OH & Fdry, frt. allowed K2	77.

CHARCOAL PIG IRON, Gross Ton

(Low phos, semi-cold blast; differential charged for silicon ove base grade; also for hard chilling iron Nos. 5 & 6)

Lyles,Tenn. T3	$60.

LOW PHOSPHOROUS PIG IRON, Gross Ton

Cleveland, intermediate, A7	$51.
Steelton,Pa. B2	54.
Philadelphia delivered	57.
Troy,N.Y. R2	54.

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Semifinished and Finished Steel Products

Mill prices as reported to STEEL Nov. 3, 1949; cents per pound unless otherwise noted. Changes shown in italics.
Code numbers following mill points indicate producing company; key on next two pages.

GOTS, Carbon, Forging (NT)

troit R7 .....$50.00
nnhall,Pa. C3 .....50.00

GOTS, Alloy (NT)

troit R7 .....$51.00
uston, Tex. S5 .....59.00
dland,Pa. C18 .....51.00
nnhall,Pa. C3 .....51.00
.Duquesne,Pa. C3 ...51.00

LETS, BLOOMS & SLABS Carbon, Rerolling (NT)

ssemer,Pa. C3 .....$52.00
irton,Pa. C3 .....52.00
nshohocken,Pa. A3 ..57.00
sley,Ala. T2 .....52.00
rfield,Ala. T2 .....52.00
ntana,Calif. K1 .....71.00
ry,Ind. C3 .....52.00
nstown,Pa. B2 .....52.00
ckawanna,N.Y. B2 ..52.00
nhall,Pa. C3 .....52.00
aron,Pa. S3 .....52.00
.Chicago,Ill. C3 .....52.00
.Duquesne,Pa. C3 ...52.00

Carbon, Forging (NT)

ssemer,Pa. C3 .....$61.00
ffalo R2 .....61.00
nton,O. R2 .....61.00
irton,Pa. C3 .....61.00
veland R2 .....61.00
nshohocken,Pa. A3 ..63.00
troit R7 .....61.00
sley,Ala. T2 .....61.00
rfield,Ala. T2 .....61.00
ntana,Calif. K1 ....80.00
ry,Ind. C3 .....61.00
eva,Utah G1 .....61.00
uston,Tex. S5 .....69.00
.Harbor,Ind. I-2 ...61.00
nstown,Pa. B2 .....61.00
ckawanna,N.Y. B2 ..61.00
nhall,Pa. C3 .....61.00
.Duquesne,Pa. C3 ...61.00
Chicago,Ill. C3, R2..61.00
arren,O. C17 .....61.00

Alloy (NT)

thlehem,Pa. B2 ....$63.00
ffalo R2 .....63.00
nton,O. R2, T7.....63.00
nshohocken,Pa. A3 ..65.00
troit R7 .....63.00
ntana,Calif. K1 ....82.00
ry,Ind. C3 .....63.00
uston,Tex. S5 .....71.00
nstown,Pa. B2 .....63.00
ckawanna,N.Y. B2 ..63.00
ssillon,O. R2 .....63.00
dland,Pa. C18 .....63.00
nhall,Pa. C3 .....63.00
aron,Pa. S3 .....63.00
Chicago,Ill. C3, R2..63.00
Duquesne,Pa. C3 ...63.00
arren,O. C17 .....63.00

EET BARS (NT)

nsfield,O. E6..(GT)$58.00
rtsmouth,O. P12 ....52.00
aron,Pa. S3 .....52.00

UNDS, SEAMLESS TUBE (NT)

nton,O. R2 .....$76.00
veland R2 .....76.00
.Harbor,Ind. I-2 ...76.00
ssillon,O. R2 .....76.00
Chicago,Ill. R2 ....76.00

ELP

quippa,Pa. J5 .....3.25
nhall,Pa. C3 .....3.25
rren,O. R2 .....3.25
ungstown C3, R2 ....3.25

RE RODS

abamaCity,Ala. R2 ..3.40
veland A7 .....3.40
nora,Pa. A7 .....3.40
nfield,Ala. T2 .....3.40
uston,Tex. S5 .....3.95
Harbor,Ind. Y1 ....3.40
nstown,Pa. B2 .....3.40
et,Ill. A7 .....3.40
Angeles B3 .....4.20
ssen,Pa. P7 .....3.40
tsburg,Calif. C11 ....4.05
rtsmouth,O. P12 ....3.40
Chicago,Ill. R2 ....3.40
rrowsPoint B2 .....3.50
rling,Ill.(1) N15 ....3.40
uthers,O. Y1 .....3.40
rance,Calif. C11 ....4.20
ncester,Mass. A7 ....3.70

STRUCTURALS

Wide Flange

Bethlehem,Pa. B2 .....3.30
Lackawanna,N.Y. B2 ..3.30
Munhall,Pa. C3 .....3.20
So.Chicago,Ill. C3 .....3.20

H.-S. Low-Alloy

Aliquippa,Pa. J5 .....4.95
Bessemer,Ala. T2 .....4.95
Bethlehem,Pa.(14) B2 ..5.05
Clairton,Pa. C3 .....4.95
Fairfield,Ala. T2 .....4.95
Fontana,Calif. K1 .....6.10
Gary,Ind. C3 .....4.95
Ind.Harbor,Ind. I-2, Y1.4.95
Johnstown,Pa. B2 .....5.05
Lackawna,N.Y.(14) B2 .5.05
Munhall,Pa.(14) C3 ....4.95
So.Chicago,Ill.(14) C3 ..4.95
Struthers,O. Y1 .....4.95

Carbon Steel Stand. Shapes

Aliquippa,Pa. J5 .....3.25
Bessemer,Ala. T2 .....3.25
Bethlehem,Pa. B2 .....3.30
Clairton,Pa. C3 .....3.25
Fairfield,Ala. T2 .....3.25
Fontana,Calif. K1 .....3.80
Gary,Ind. C3 .....3.25
Geneva,Utah G1 .....3.25
Houston,Tex. S5 .....3.65
Ind.Harbor,Ind. I-2 ...3.25
Johnstown,Pa. B2 .....3.30
KansasCity,Mo. S5 ....3.85
Lackawanna,N.Y. B2 ..3.30
LosAngeles B3 .....3.85
Minnequa,Colo. C10 ....3.75
Munhall,Pa. C3 .....3.25
Niles,Calif.(22) P1 .....3.97
Portland,Oreg. O4 .....3.90
Seattle B3 .....3.90
So.Chicago,Ill. C3, W14 .3.25
So.SanFrancisco B3 ....3.80
Torrance,Calif. C11 ....3.85
Weirton,W.Va. W6 .....3.25

Alloy Stand. Shapes

Clairton,Pa. C3 .....4.05
Fontana,Calif. K1 .....5.25
Munhall,Pa. C3 .....4.05
So.Chicago,Ill. C3 .....4.05

SHEET STEEL PILING

Ind.Harbor,Ind. I-2 ....4.05
Lackawanna,N.Y. B2 ...4.05
Munhall,Pa. C3 .....4.05
So.Chicago,Ill. C3 .....4.05
Weirton,W.Va. W6 .....4.05

PLATES, Carbon Steel

AlabamaCity,Ala. R2 ..3.40
Aliquippa,Pa. J5 .....3.40
Ashland,Ky.(15) A10 ...3.40
Bessemer,Ala. T2 .....3.40
Clairton,Pa. C3 .....3.40
Claymont,Del. W16 ....3.50
Cleveland J5, R2 .....3.40
Coatesville,Pa. L7 .....3.50
Conshohocken,Pa. A3 ...3.50
Ecorse,Mich. G5 .....3.65
Fairfield,Ala. T2 .....3.40
Fontana,Calif. K1 .....4.00
Gary,Ind. C3 .....3.40
Geneva,Utah G1 .....3.40
Harrisburg,Pa. C5 .....3.75
Houston,Tex. S5 .....3.80
Ind.Harbor,Ind. I-2, Y1.3.40
Johnstown,Pa. B2 .....3.40
Lackawanna,N.Y. B2 ...3.40
Minnequa,Colo. C10 ....4.30
Munhall,Pa. C3 .....3.40
Pittsburgh J5 .....3.40
Seattle B3 .....4.30
Sharon,Pa. S3 .....3.40
So.Chicago,Ill. C3, W14 .3.40
SparrowsPoint,Md. B2 ..3.40
Steubenville,O. W10 ....3.40
Warren,O. R2 .....3.40
Weirton,W.Va. W6 .....3.40
Youngstown C3, R2 ....3.40
Youngstown C3, Y1 ....3.40

PLATES (Universal Mill)

Fontana,Calif. K1 .....4.30

PLATES, Open-Hearth Alloy

Coatesville,Pa. L7 .....4.50
Conshohocken,Pa. A3 ...4.40
Fontana,Calif. K1 .....5.40
Gary,Ind. C3 .....4.40
Johnstown,Pa. B2 .....4.40
Munhall,Pa. C3 .....4.40
Sharon,Pa. S3 .....4.40
So.Chicago,Ill. C3 .....4.40
SparrowsPoint,Md. B2 ..4.40

PLATES, Ingot Iron

Ashland,cl(15) A10 ....3.65
Ashland,lcl(15) A10 ....4.15
Cleveland,cl R2 .....3.65
Warren,O.,cl R2 .....3.65

PLATES, Wrought Iron

Economy,Pa. B14 .....7.85

PLATES,High-Strength Low-Alloy

Aliquippa,Pa. J5 .....5.20
Bessemer,Ala. T2 .....5.20
Clairton,Pa. C3 .....5.20
Cleveland J5, R2 .....5.20
Conshohocken,Pa. A3 ..5.20
Ecorse,Mich. G5 .....5.45
Fairfield,Ala. T2 .....5.20
Fontana,Calif. K1 .....5.80
Gary,Ind. C3 .....5.20
Geneva,Utah G1 .....5.20
Houston,Tex. S5 .....5.60
Ind.Harbor,Ind. I-2, Y1.5.20
Johnstown,Pa. B2 .....5.20
Munhall,Pa. C3 .....5.20
Pittsburgh J5 .....5.20
Sharon,Pa. S3 .....5.65
So.Chicago,Ill. C3 .....5.20
SparrowsPoint,Md. B2 ..5.20
Warren,O. R2 .....5.20
Youngstown Y1 .....5.20

FLOOR PLATES

Cleveland J5 .....4.55
Conshohocken,Pa. A3 ...4.55
Harrisburg,Pa. C5 .....4.55
Ind.Harbor,Ind. I-2 ....4.55
Munhall,Pa. C3 .....4.55
So.Chicago,Ill. C3 .....4.55

BARS, Hot-Rolled Carbon

AlabamaCity,Ala. R2 ...3.35
Aliquippa,Pa. J5 .....3.35
Alton,Ill.(1) L1 .....3.35
Ashland,Ky. (17) A10 ..3.35
Atlanta,Ga. A11 .....3.50
Bessemer,Ala. T2 .....3.35
Buffalo R2 .....3.35
Canton,O. R2 .....3.35
Clairton,Pa. C3 .....3.35
Cleveland R2 .....3.35
Ecorse,Mich. G5 .....3.55
Emeryville,Calif. J7 ....4.10
Fairfield,Ala. T2 .....3.35
Fontana,Calif. K1 .....4.00
Gary,Ind. C3 .....3.35
Houston,Tex. S5 .....3.75
Ind.Harbor,Ind. I-2, Y1.3.35
Johnstown,Pa. B2 .....3.35
KansasCity,Mo. S5 ....3.95
Lackawanna,N.Y. B2 ..3.35
LosAngeles B3 .....4.05
Marion,O. P11 .....3.35
Midland,Pa. C18 .....3.35
Milton,Pa. B6 .....3.35
Minnequa,Colo. C10 ....3.85
Niles,Calif. P1 .....4.05
N.Tonawanda,N.Y. B11 .3.35
Pittsburg,Calif. C11 ....4.05
Pittsburgh J5 .....3.35
Portland,Oreg. O4 .....4.10
Seattle B3, N14 .....4.10
S.Chicago C3, R2, W14..3.35
So.Duquesne,Pa. C3 ....3.35
S.SanFran.,Cal. B3 ....4.10
Struthers,O. Y1 .....3.35
Torrance,Calif. C11 ....4.05
Weirton,W.Va. W6 .....3.35
Youngstown C3, R2 ....3.35

BAR SIZE ANGLES; S. SHAPES

Aliquippa,Pa. J5 .....3.35
Atlanta,Ga. A11 .....3.50
Bethlehem,Pa.(2) B2 ...3.55
Johnstown,Pa. B2 .....3.35
Lackawanna,N.Y. B2 ..3.35
Niles,Calif. P1 .....4.05
Pittsburgh(23) J5 .....3.35
Portland,Oreg. O4 .....4.10
SanFrancisco S7 .....4.05
Weirton,W.Va. W6 .....3.35

BARS, Hot-Rolled Alloy

Bethlehem,Pa. B2 .....3.75
Buffalo R2 .....3.75
Canton,O. R2, T7 .....3.75
Clairton,Pa. C3 .....3.75
Ecorse,Mich. G5 .....4.05
Fontana,Calif. K1 .....4.75
Gary,Ind. C3 .....3.75
Houston,Tex. S5 .....4.15
Ind.Harbor,Ind. I-2, Y1.3.75
Johnstown,Pa. B2 .....3.75
KansasCity,Mo. S5 .....4.35
Lackawanna,N.Y. B2 ..3.75
LosAngeles B3 .....4.80
Massillon,O. R2 .....3.75
Midland,Pa. C18 .....3.75
S.Chicago C3, R2, W14..3.75
So.Duquesne,Pa. C3 ....3.75
Struthers,O. Y1 .....3.75
Warren,O. C17 .....3.75
Youngstown C3 .....3.75

BAR SHAPES, Hot-Rolled Alloy

Clairton,Pa. C3 .....4.00
Fontana,Calif. K1 .....4.75
Gary,Ind. C3 .....4.00
Youngstown C3 .....4.00

BARS & SMALL SHAPES, H.R., High-Strength Low-Alloy

Aliquippa,Pa. J5 .....5.10
Bessemer,Ala. T2 .....5.10
Bethlehem,Pa. B2 .....5.10
Clairton,Pa. C3 .....5.10
Cleveland R2 .....5.10
Ecorse,Mich. G5 .....5.30
Fairfield,Ala. T2 .....5.10
Fontana,Calif. K1 .....6.15
Gary,Ind. C3 .....5.10
Ind.Harbor,Ind. I-2, Y1.5.10
Johnstown,Pa. B2 .....5.10
Lackawanna,N.Y. B2 ..5.10
Pittsburgh J5 .....5.10
So.Duquesne,Pa. C3 ....5.10
Struthers,O. Y1 .....5.10
Youngstown C3 .....5.10

BARS, Cold-Finished Carbon

Aliquippa,Pa. K5 .....4.00
Ambridge,Pa. W18 .....4.00
BeaverFalls, M12, R2...4.00
Buffalo B5 .....4.00
Camden,N.J. P13 .....4.48
Carnegie,Pa. C12 .....4.00
Chicago W18 .....4.00
Cleveland A7, C20 .....4.00
Cumberland,Md. C19 ...3.95
Donora,Pa. A7 .....4.00
Ecorse,Mich. G5 .....4.30
Elyria,O. W8 .....4.00
FranklinPark,Ill. N5 ...4.00
Gary,Ind. R2 .....4.00
Hammond,Ind. L2, M13.4.00
Hartford,Conn. R2 .....4.40
Harvey,Ill. B5 .....4.00
Indianapolis M13 .....4.20
LosAngeles R2 .....5.40
Mansfield,Mass. B5 ....4.40
Massillon,O. R2, R8....4.00
Midland,Pa. C18 .....4.00
Monaca,Pa. S17 .....4.00
Newark,N.J. W18 .....4.40
Plymouth,Mich. P5 .....4.25
Pittsburgh J5 .....3.95
Putnam,Conn. W18 ....4.40
Readville,Mass. C14 ...4.40
St.Louis,Mo. M5 .....4.35
So.Chicago,Ill. W14 ....4.00
SpringCity,Pa.(5) K3 ..4.48
Struthers,O. Y1 .....4.00
Waukegan,Ill. A7 .....4.00
Youngstown F3, Y1.....4.00

BARS, Cold-Finished Alloy

Aliquippa,Pa. K5 .....4.65
Ambridge,Pa. W18 .....4.65
BeaverFalls,Pa. M12 ...4.65
Bethlehem,Pa. B2 .....4.65
Buffalo B5 .....4.65
Canton,O. R2, T7.....4.65
Carnegie,Pa. C12 .....4.65
Chicago W18 .....4.65
Cleveland A7, C20 .....4.65
Donora,Pa. A7 .....4.65
Elyria,O. W8 .....4.65
Gary,Ind. R2 .....4.65
Hammond,Ind. L2, M13.4.65
Hartford,Conn. R2 .....4.95
Harvey,Ill. B5 .....4.65
Indianapolis M13 .....4.85
Lackawanna,N.Y. B2 ..4.65
Mansfield, Mass. B5...4.95
Massillon,O. R2, R8....4.65
Midland,Pa. C18 .....4.65
Monaca,Pa. S17 .....4.65
Newark,N.J. W18 .....4.95
So.Chicago,Ill. R2, W14.4.65
Struthers,O. Y1 .....4.65
Waukegan,Ill. A7 .....4.65
Worcester,Mass. A7 ....4.95
Youngstown F3, Y1.....4.65

BARS, Reinforcing (Fabricators)

AlabamaCity,Ala. R2 ...3.35
Alton,Ill.(6) L1 .....3.35
Atlanta,Ga. A11 .....3.50
Buffalo R2 .....3.35
Cleveland R2 .....3.35
Emeryville,Calif. J7 ....4.10
Fairfield,Ala. T2 .....3.35
Fontana,Calif. K1 .....4.00
Gary,Ind. C3 .....3.35
Houston,Tex. S5 .....3.75
Ind.Harbor,Ind. I-2, Y1 .3.35
Johnstown,Pa. B2 .....3.35
KansasCity, Mo. S5....3.95
Lackawanna,N.Y. B2 ...3.35
LosAngeles B3 .....4.05
Minnequa,Colo. C10 ....4.25
Niles,Calif. P1 .....4.05
Pittsburg,Calif. C11 ....4.05
Pittsburgh J5 .....3.35
Portland,Oreg. O4 .....4.10
Seattle, Wash. B3, N14..4.10
So.Chicago,Ill. R2 .....3.35
So.Duquesne,Pa. C3 ....3.35
So.SanFrancisco B3 ....4.10
SparrowsPoint,Md. B2..3.35
Struthers,O. Y1 .....3.35
Torrance,Calif. C11 ....4.05
Youngstown C3, R2 ....3.35

BARS, Reinforcing (Fabricated; to Consumers)

Huntington,W.Va. W7 ..4.50
Johnstown,¼-1" B2 ....4.25
LosAngeles B3 .....5.00
Marion,O. P11 .....4.25
Pittsburgh J5 .....4.25
Seattle B3, N14 .....5.00
So.SanFrancisco B3 ....5.00
SparrowsPt.,1⅛-1¼" B2..4.83
SparrowsPt.,¼-1" B2 ...4.25

RAIL STEEL BARS

ChicagoHts.,Ill.(3) I-2 ..3.25
FortWorth,Tex.(4) T4 ...4.33
Hntngtn,W.Va.(3,4) W7.3.35
Moline,Ill.(3) R2 .....3.35
Williamsport(2,3) S19 ...3.35
Williamsport(4) S19 ....3.85

BARS, Wrought Iron

Economy,Pa.(S.R.)B14..9.50
Economy,Pa.(D,R.)B14.11.00
Economy(Stabit) B14 ..11.30
McK.Rks.(S.R.) L5 ....8.60
McK.Rks.(D.R.) L5 ...11.25
McK.Rks.(Staybolt) L5..12.75

BARS, Hot-Rolled Ingot Iron

Ashland,Ky.(17) A10 ...3.60

SHEETS, Hot-Rolled Steel (18 gage and heavier)

AlabamaCity,Ala. R2 ...3.25
Ashland,Ky.(8) A10 ...3.25
Butler,Pa. A10 .....3.25
Cleveland J5, R2 .....3.25
Conshohocken,Pa. A3 ...3.35
Ecorse,Mich.(8) G5 ....3.45
Fairfield,Ala. T2 .....3.25
Fontana,Calif. K1 .....4.15
Gary,Ind. C3 .....3.25
Ind.Harbor,Ind. I-2, Y1..3.25
Irvin,Pa. C3 .....3.25
Kokomo,Ind. C16 .....3.35
Lackawanna,N.Y. B2 ...3.25
Munhall,Pa. C3 .....3.25
Niles,O. M4 .....3.25
Pittsburg,Calif. C11 ....3.95
Pittsburgh J5 .....3.25
Sharon,Pa. S3 .....3.25
So.Chicago,Ill. W14 ....3.25
SparrowsPoint,Md. B2 ..3.25
Steubenville,O. W10 ....3.25
Torrance,Calif. C11 ....3.95
Warren,O. R2 .....3.25
Weirton,W.Va. W6 .....3.25
Youngstown C3, Y1 ....3.25

SHEETS, Hot-Rolled Carbon Steel (19 gage and lighter)

AlabamaCity,Ala. R2 ...4.40
Dover,O. R1 .....5.00
Fairfield,Ala. T2 .....4.15
Ind.Harbor,Ind. I-2 ....4.15
Kokomo,Ind. C16 .....4.25
Mansfield,O. E6 .....4.15
Niles,O. N12, M4 .....4.15
Torrance,Calif. C11 ....5.05

SHEETS, Cold-Rolled Steel (Commercial Quality)

Butler,Pa. A10 .....4.00
Cleveland J5 R2 .....4.00
Ecorse,Mich. G5 .....4.20
Fairfield,Ala. T2 .....4.00
Follansbee,W.Va. F4 ....4.00
Fontana,Calif. K1 .....4.90
Gary,Ind. C3 .....4.00
GraniteCity,Ill. G4 .....4.20
Ind.Harbor,Ind. I-2, Y1.4.00
Irvin,Pa. C3 .....4.00
Lackawanna,N.Y. B2 ...4.00
Middletown,O. A10 ....4.00
Niles,O. M4 .....4.00
Pittsburg,Calif. C11 ....4.95
Pittsburgh J5 .....4.00
SparrowsPoint,Md. B2 ..4.00
Steubenville,O. W10 ....4.00
Warren,O. R2 .....4.00
Weirton,W.Va. W6 .....4.00
Youngstown Y1 .....4.00

SHEETS, Cold-Rolled, High-Strength Low-Alloy

Cleveland J5, R2 .....6.05
Ecorse,Mich. G5 .....6.25
Fontana,Calif. K1 .....6.95
Gary,Ind. C3 .....6.05
Ind.Harbor,Ind. I-2, Y1.6.05
Irvin,Pa. C3 .....6.05
Lackawanna,N.Y. B2 ...6.05
Pittsburgh J5 .....6.05
Sharon,Pa. S3 .....6.05
SparrowsPoint,Md. B2 ..6.05
Warren,O. R2 .....6.05
Weirton,W.Va. W6 .....6.05
Youngstown Y1 .....6.05

SHEETS, H-R (14 ga., heavier) High-Strength Low-Alloy

Cleveland J5, R2 .....4.95
Conshohocken,Pa. A3 ...4.95
Ecorse,Mich. G5 .....5.15
Fairfield,Ala. T2 .....4.95
Fontana,Calif. K1 .....6.64
Gary,Ind. C3 .....4.95
Ind.Harbor,Ind. I-2, Y1.4.95
Irvin,Pa. C3 .....4.95
Lackawanna,N.Y. B2 ..4.95
Pittsburgh J5 .....4.95
Sharon,Pa. S3 .....4.95
So.Chicago,Ill. C3 ....4.95
SparrowsPoint,Md. B2 ..4.95
Warren,O. R2 .....4.95
Weirton,W.Va. W6 .....4.95
Youngstown C3, Y1 ....4.95

SHEETS, Gal'zd No. 10 Steel

AlabamaCity,Ala. R2 ..4.40
Ashland,Ky.(8) A10 ....4.40
Canton,O. R2 .....4.40
Delphos,O. N16 .....5.40
Dover,O. R1 .....5.40
Fairfield,Ala. T2 .....4.40
Gary,Ind. C3 .....4.40
GraniteCity,Ill. G4 ....4.60
Ind.Harbor,Ind. I-2 ...4.40
Irvin,Pa. C3 .....4.40
Kokomo,Ind. C16 ....4.50
MartinsFerry,O. W10 ..4.40
Niles,O. N12 .....4.40
Pittsburg,Calif. C11 ....5.15
SparrowsPoint,Md. B2 ..4.40
Steubenville,O. W10 ....4.40
Torrance, Calif. C11 ....5.15
Weirton,W.Va. W6 .....4.40

SHEETS, Galvanized No. 10, High-Strength Low-Alloy

Irvin,Pa. C3 .....6.75
SparrowsPoint,Md. B2 ..6.75

SHEETS, Galvannealed Steel

Canton,O. R2 .....4.95
Irvin,Pa. C3 .....4.95
Kokomo,Ind. C16 ....5.05
Niles,O. N12 .....4.95

SHEETS, Zincgrip No. 10

Butler,Pa. A10 .....4.65
Middletown,O. A10 ....4.65

SHEETS, Electro Galvanized

Cleveland R2 .....5.15
Niles,O. R2 .....5.15
Weirton,W.Va. W6 .....5.00

SHEETS, Zinc Alloy

Ind.Harbor,Ind. I-2 ....5.05

SHEETS, Culvert, No. 16 Flat

	Cu Alloy	Cu FE
Ashland A10	5.00	...
Canton,O. R2 ...	5.05	5.50
Fairfield,Ala. T-2	5.00	5.35
Gary C3	5.00	5.35
GraniteCity G4 ..	5.40	5.70
Irvin C3	5.00	5.35
Kokomo C16	5.40	...
MartinsFy,O. W10	5.00	5.35
Pittsburg,Cal. C11	5.75	...
SparrowsPt. B2 .	5.00	...
Torrance,Cal. C11	5.75	...

SHEETS, Culvert, No. 16 Flat Ingot Iron

Ashland,Ky. A10 .....5.25

SHEETS, Well Casing

Torrance,Calif. C11 ....4.75
Youngstown C3 .....3.75

SHEETS, Aluminized

Butler,Pa. A10 .....7.75

SHEETS, Long Terne, Steel (No. 10; Commercial Quality)

BeechBotm.,W.Va. W10.4.80
Gary,Ind. C3 .....4.80
Mansfield,O. E6 .....4.80
Middletown,O. A10 ....4.80
Weirton,W.Va. W6 .....4.80

ROOFING SHORT TERNES (Package; 8 lb coated)

Gary,Ind. C3 .....$17.50
Yorkville, O. W10 .....17.50

MANUFACTURING TERNES (Special Coated)

Fairfield,Ala. T2 .....$6.75
Gary,Ind. C3 .....6.65
Ind.Harbor,Ind. I-2 ....6.65
Irvin,Pa. C3 .....6.65
Weirton,W.Va. W6 .....6.65
Yorkville,O. W10 .....6.65

SHEETS, Lt. Coated Ternes, 6 lb

Yorkville,O. W10 .....$7.20

SHEETS, Mfg. Ternes, 8 lb

Gary,Ind. C3 .....$8.10
Yorkville,O. W10 .....8.10

SHEETS, Coated Ternes, 12 lb

Gary,Ind. C3 .....8.95
Yorkville,O. W10 .....8.95

SHEETS, Long Terne, Ingot Iron

Middletown,O. A10 .....5.20

SHEETS, Hot-Rolled Ingot Iron 18 Gage and Heavier

Ashland,Ky.(8) A10 ....3.50
Cleveland R2 .....3.85
Ind.Harbor,Ind. I-2 ....3.50
Warren,O. R2 .....3.85

SHEETS, Cold-Rolled Ingot Iron

Cleveland R-2 .....4.60
Middletown,O. A10 .....4.50
Warren,O. R2 .....4.60

SHEETS, Galvanized Ingot Iron No. 10 Flat

Ashland,Ky.(8) A10 ....4.65
Canton,O. R2 .....5.15
Ind.Harbor,Ind. I-2 ....4.95

SHEETS, Zincgrip No. 10 Flat, Ingot Iron

Butler,Pa. A10 .....4.90
Middletown,O. A10 .....4.90

HOLLOWARE ENAMELING Black Plate (29 gage)

Aliquippa,Pa. J5 .....5.30
Follansbee,W.Va. F4 ...5.30
Gary,Ind. C3 .....5.30
GraniteCity,Ill. G4 .....5.50
Ind.Harbor,Ind. Y1 ....5.30
Irvin,Pa. C3 .....5.30
Niles,O. R2 .....5.30
SparrowsPoint,Md. B2 5.40
Warren,O. R2 .....5.30
Yorkville,O. W10 .....5.30

SHEETS, Enam'lg. Iron, No. 12

Ashland,Ky.(8) A10 ....4.40
Cleveland R2 .....4.40
Ecorse,Mich. G5 .....4.70
Gary,Ind. C3 .....4.40
GraniteCity,Ill. G4 .....4.60
Ind.Harbor,Ind. I-2 ....4.40
Irvin,Pa. C3 .....4.40
Middletown,O. A10.....4.40
Niles,O. M4 .....4.40
Youngstown Y1 .....4.40

CANMAKING BLACK PLATE (Base Box)

Aliquippa,Pa. J5 ....$5.75
Fairfield,Ala. T2 .....5.85
Gary,Ind. C3 .....5.75
GraniteCity,Ill. G4 .....5.95
Ind.Harbor,Ind. I-2, Y1.5.75
Irvin,Pa. C3 .....5.75
Niles,O. R2 .....5.75
Pittsburg,Calif. C11 ....6.50
SparrowsPoint,Md. B2 ..5.85
Warren,O. R2 .....5.75
Weirton,W.Va. W6 .....5.75
Yorkville,O. W10 .....5.75

TIN PLATE, American Coke (Base Box)

	1.25 lb	1.50 lb
Aliquippa J5	$7.50	$7.75
Fairfield,Ala. T2.	7.60	7.85
Gary C3	7.50	7.75
Gran.City,Ill. G4.	7.70	7.95
Ind.Harb. I-2, Y1	7.50	7.75
Irvin,Pa. C3	7.50	7.75
Pitts.,Cal. C11 ..	8.25	8.50
Sp.Pt.,Md. B2 ..	7.60	7.85
Warren R2	7.50	7.75
Weirton W6	7.50	7.75
Yorkville,O. W10.	7.50	7.75

STRIP, Hot-Rolled Ingot Iron

Ashland,Ky.(8) A10 ....3.50
Warren,O. R2 .....3.85

STRIP, Cold-Rolled Ingot Iron

Warren,O. R2 .....4.60

STRIP, Hot-Rolled Carbon

Alton,Ill.(1) L1 .....3.25
Ashland,Ky.(8) A10 ....3.25
Atlanta A11 .....3.40
Bessemer,Ala. T2 .....3.25
Bridgeprt,Conn.(10) S15.3.25
Butler,Pa. A10 .....3.25
Carnegie,Pa. S18 .....3.25
Cleveland J5 .....3.25
Detroit M1 .....3.45
Ecorse,Mich. G5 .....3.45
Fairfield,Ala. T2 .....3.25
Fontana,Calif. K1 .....4.40
Gary,Ind. C3 .....3.25
Houston,Tex. S5 .....3.65
Ind.Harbor,Ind. I-2, Y1.3.25
KansasCity,Mo.(9) S5 ..3.85
Lackawanna,N.Y. B2 ..3.25
LosAngeles B3 .....4.00
Milton,Pa. B6 .....3.25
Minnequa, Colo. C10 ....4.30
NewBritain(10) S15 ....3.25
N.Tonawanda,N.Y. B11 .3.30
Pittsburg,Calif. C11 ....4.00
Pittsburgh J5 .....3.25
Riverdale,Ill. A1 .....3.25
SanFrancisco S7 .....4.00
Seattle B3, N14 .....4.25
Sharon,Pa. S3 .....3.25
So.Chicago,Ill. W14 ....3.25
So.SanFrancisco B3 ....4.00
SparrowsPoint,Md. B2 ..3.25
Torrance,Calif. C11 ....4.00
Warren,O. R2 .....3.25
Weirton,W.Va. W6 ....3.25
WestLeechburg,Pa. A4 ..3.25
Youngstown C3, Y1 ....3.25

STRIP, Hot-Rolled Alloy

Bridgeprt,Conn.(10) S15.5.10
Carnegie,Pa. S18 .....5.10
Fontana,Calif. K1 .....6.30
Gary,Ind. C3 .....5.10
Houston,Tex. S5 .....5.50
KansasCity,Mo. S5 ....5.70
NewBritn,Conn.(10) S15.5.10
Sharon,Pa. S3 .....5.10
Youngstown C3 .....5.10

STRIP, Cold-Rolled Alloy Steel

Bridgeprt,Conn.(10) S15.9.50
Carnegie,Pa. S18 .....9.50
Cleveland A7 .....9.50
Dover,O. G6 .....9.50
Harrison,N.J. C18 .....9.80
NewBritn,Conn.(10) S15.9.50
Pawtucket,R.I.(11) N8..9.50
Pawtucket,R.I.(12) N8..
Sharon,Pa. S3 .....
Worcester,Mass. A7 ....
Youngstown C8 .....

STRIP, Cold-Rolled Carbon

Berea,O. C7 .....
Bridgeprt,Conn.(10) S15.
Butler,Pa. A10 .....
Chicago,Ill. T6 .....
Cleveland A7, J5 .....
Detroit, D2, D3 .....
Detroit M1 .....
Dover,O. G6 .....
Ecorse,Mich. G5 .....
Follansbee,W.Va. F4 ...
Fontana,Calif. K1 .....
Ind.Harbor,Ind. I-2 ....
Lackawanna,N.Y. B2 ..
LosAngeles C1 .....
Mattapan,Mass.(21) T6
Middletown,O. A10 .....
NewBritain(10) S15 ....
NewCastle,Pa. B4, E5..
NewHaven,Conn. A7, D2
NewKensington,Pa. A6..
NewYork W3 .....
Pawtucket,R.I.(11) N8 .
Pawtucket,R.I.(21) N8 .
Pawtucket,R.I. R3 .....
Pittsburgh J5 .....
Riverdale,Ill. A1 .....
Sharon,Pa. S3 .....
SparrowsPoint,Md. B2 ..
Trenton,N.J.(13) R5 ...
Wallingford,Conn. W2 ..
Warren,O. R2, T5 .....
Weirton,W.Va. W6 .....
Youngstown C8, Y1 .....

STRIP, Cold-Rolled, High-strength Low-Alloy

Cleveland A7, J5 .....
Dover,O. G6 .....
Ecorse,Mich. G5 .....
Fontana,Calif. K1 .....
Lackawanna,N.Y. B2 ...
Pittsburgh J5 .....
Sharon,Pa. S3 .....
SparrowsPoint,Md. B2 ..
Warren,O. R2 .....
Weirton,W.Va. W6 .....
Youngstown Y1 .....

STRIP, Electro Galvanized

Weirton,W.Va. W6 .....
Youngstown C8 .....

TIN PLATE, Electrolytic (Base Box)

	0.25 lb	0.50 lb	0.75 lb
Aliquippa,Pa. J5	$6.45	$6.70	$7.00
Fairfield,Ala. T2	6.55	6.80	7.10
Gary,Ind. C3	6.45	6.70	7.00
GraniteCity,Ill. G4	6.65	6.90	7.20
Ind.Harbor,Ind. I-2, Y1	6.45	6.70	7.00
Irvin,Pa. C3	6.45	6.70	7.00
Niles,O. R2	6.45	6.70	7.00
Pittsburg,Calif. C11	7.20	7.45	7.75
SparrowsPoint,Md. B2	6.55	6.80	7.10
Weirton,W.Va. W6	6.45	6.70	7.00
Yorkville,O. W10	6.45	6.70	7.00

SHEET SILICON (24 Gage Base)

	Field	Arm.	Elec.	Motor	Dyn.
BeechBottom,W.Va. W10	...	5.45	5.95	6.70	7.50
Brackenridge,Pa. A4	...	...	5.95	6.70	7.50
Follansbee,W.Va. F4	...	5.45	5.95	6.70	7.50
GraniteCity,Ill. G4	...	...	6.15	6.90	7.70
Ind.Harbor,Ind. I-2	5.15	5.45	5.95	...	...
Mansfield,O. E6	5.15	5.45	5.95	6.70	...
Niles,O. M4	5.15	5.45	5.95	...	...
Niles,O. N12	...	5.45	5.95	...	...
Toronto,O. F4	...	5.45	5.95	6.70	7.50
Vandergrift,Pa. C3	...	5.45	5.95	6.70	7.50
Warren,O. R2	...	5.45	5.95	6.70	...
Zanesville,O. A10	...	5.45	5.95	6.70	7.50

COILS AND CUT LENGTHS, Cold-Rolled, Silicon

	Field	Arm.	Elec.	Motor	Dyn.
Vandergrift,Pa. C3	...	5.70	6.20	6.95	7.75
Warren,O. R2	5.40	5.70	6.20	6.95	7.75

SHEETS, Silicon Transformer Grade

	72	65	58	52
BeechBottom,W.Va. W10	8.05	8.60	9.30	10.10
Brackenridge,Pa. A4	8.05	8.60	9.30	....
Follansbee,W.Va. F4	8.05	8.60	9.30	10.10
Toronto,O. F4	8.05	8.60	9.30	10.10
Vandergrift,Pa. C3	8.05	8.60	9.30	10.10
Zanesville,O. A10	8.05	8.60	9.30	10.10

COLD-REDUCED COILS and Cut Lengths, Silicon

	72	T-100	T-90	T-80
Butler,Pa. A10	...	12.35	13.60	14.85
Vandergrift,Pa. C3	8.30	11.35	12.60	13.85
Warren,O. R2	8.30	....	....	....

STRIP, Cold-Finished, Spring Steel (Annealed)

	0.25-0.40c	0.40-0.60c	0.60-0.80c	0.80-1.05c
Bridgeprt,Conn.(10) S15	4.00	5.50	6.10	8.05
Bristol,Conn. W1	...	...	6.40	8.35
Carnegie,Pa. S18	...	5.50	6.10	8.05
Chicago T6	4.25	5.65	6.25	8.20
Cleveland A7	4.00	5.50	6.10	8.05
Dover,O. G6	4.00	5.50	6.10	7.85
Harrison,N.J. C18	...	...	6.40	8.35
Mattapan,Mass. T6	4.50	5.80	6.40	8.35
NewBritn.,Conn.(10) S15	4.00	5.50	6.10	8.05
NewCastle,Pa. B4	4.00	5.50	6.10	...
NewYork W3	...	5.80	6.40	8.35
Pawtucket,R.I. N8 .... Cleve.orPitts.Base	4.55	5.50	6.10	8.05
Worcester,Mass.Base	4.50	5.80	6.40	8.35
Sharon,Pa. S3	4.00	5.50	6.10	8.05
Trenton,N.J. R5	...	6.30	6.90	8.85
Union,N.J. H6	4.40	6.35	6.35	8.30
Wallingford,Conn. W2 ..	4.50	5.80	6.40	8.05
Weirton,W.Va. W6	4.00	5.50	6.10	8.05
Worcester,Mass. A7	4.30	5.80	6.40	8.35
Worcester,Mass, T6	4.50	5.80	6.40	8.35
Youngstown C8	4.50	5.50	6.10	8.05

Key to Producing Companies

A1 Acme Steel Co.
A3 Alan Wood Steel Co.
A4 Allegheny Ludlum Steel
A6 American Shim Steel Co.
A7 American Steel & Wire
A8 Anchor Drawn Steel Co.
A9 Angell Nail & Chaplet
A10 Armco Steel Corp.
A11 Atlantic Steel Co.

B1 Babcock & Wilcox Tube
B2 Bethlehem Steel Co.
B3 Beth. Pac. Coast Steel
B4 Blair Strip Steel Co.
B5 Bliss & Laughlin Inc.
B6 Bolardi Steel Corp.
B8 Braeburn Alloy Steel
B11 Buffalo Bolt Co.
B14 A. M. Byers Co.

C1 Calif. Cold-Rolled Steel
C3 Carnegie-Illinois Steel
C4 Carpenter Steel Co.
C5 Central Iron & Steel Div. Barium Steel Corp.
C7 Cleve.Cld.Roll.MillsCo.
C8 Cold Metal Products Co.
C9 Colonial Steel Co.
C10 Colorado Fuel & Iron
C11 Columbia Steel Co.
C12 Col. Steel & Shafting Co.
C13 Columbia Tool Steel Co.
C14 Compressed Steel Shaft.
C16 Continental Steel Corp.
C17 Copperweld Steel Co.
C18 Crucible Steel Co.
C19 Cumberland Steel Co.
C20 Cuyahoga Steel & Wire

D2 Detroit Steel Corp.
D3 Detroit Tube & Steel Co.
D4 Disston & Sons,Henry
D6 Driver Harris Co.

E1 Eastrn.Gas&Fuel Assoc.
E2 Eastern Stainless Steel
E4 Electro Metallurgical Co.
E5 Elliot Bros. Steel Co.
E6 Empire Steel Co.

F2 Firth Sterling Steel
F3 Fitzsimons Steel Co.
F4 Follansbee Steel Corp.
F6 Fretz-Moon Tube Co.

G1 Geneva Steel Co.
G2 Globe Iron Co.
G3 Globe Steel Tubes Co
G4 Granite City Steel Co
G5 Great Lakes Steel Co
G6 Greer Steel Co.

H1 Hanna Furnace Corp
H4 Heppenstall Co.
H6 Hind Steel Co.Inc.

I-1 Igoe Bros.Inc.
I-2 Inland Steel Co.
I-3 Interlake Iron Corp.
I-4 Ingersoll Steel Div., Borg-Warner Corp.

J1 Jackson Iron & Steel
J3 Jessop Steel Co.
J4 Johnson Steel & Wire
J5 Jones & Laughlin Ste
J6 Joslyn Mfg. & Supply
J7 Judson Steel Corp.

K1 Kaiser Steel Corp.
K2 Keokuk Electro-Mets
K3 Keystone Drawn Ste
K4 Keystone Steel & Wi
K5 Kidd Drawn Steel Co
L1 Laclede Steel Co.
L2 LaSalle Steel Co.
L3 Latrobe Electric Stee
L5 Lockhart Iron & Stee

IP, Hot-Rolled, ligh-Strength Low-Alloy

semer,Ala. T2	4.95
veland J5	4.95
rse,Mich. G5	5.15
rfield,Ala. T2	4.95
tana,Cal. K1	6.64
y,Ind. C3	4.95
.Harb.,Ind. I-2, Y1	4.95
kawanna,N.Y. B2	4.95
tsburgh J5	4.95
ron,Pa. S3	4.95
rrowsPoint,Md. B2	4.95
rren,O. R2	4.95
rton,W.Va. W6	4.95
ngstown C3, Y1	4.95

HT COOPERAGE HOOP

anta A11	3.60
erdale,Ill. A1	3.60
ron,Pa. S3	3.60
ngstown C3	3.60

E, Cold-Rolled Flat

cago T6	5.35
veland A7	5.00
er,O. G6	5.00
toria,O. S1	5.50
omo,Ind. C16	5.00
ssillon,O. R8	5.00
nessen,Pa. P7	5.00
tucket,R.I.(11) NS	5.55
tucket,R.I.(12) N8	5.50
nton,N.J. R5	5.80
rcester,Mass. A7	5.30
rcester,Mass. T6	5.30

E, Fine and Weaving 3-in. Coils)

rtonville,Ill.(19) K4	7.70
cago W13	7.70
veland A7	7.70
toria,O. S1	7.70
nstown,Pa. B2	7.70
omo,Ind. C16	7.70
tsmouth,O. P12	7.70
uthers,O. Y1	7.70
nton,N.J. R5	8.50
ukegan,Ill. A7	7.70
rcester, Mass. A7, T6	8.00

RE (16 gage)	**An'ld.**	**Galv. Stone**
quippa J5	9.05	10.55
rtnvill(19) K4	9.05	10.55
veland A7	9.05	10.55
toria,O. S1	9.15	10.65
nstown B2	9.05	10.55
komo C16	9.05	10.10
neaqua C10	9.40	10.90
s.,Cal. C11	9.40	10.90
smith.(18) P12	9.05	10.55

RE WIRE	**Plow**	**Plow**	**Plow**
rtonville,Ill. K4	7.10	7.40	7.80
veland A7	7.50	7.80	8.20
nora,Pa. A7	7.50	7.80	8.20
toria,O. S1	8.00	8.30	8.70
nstown,Pa. B2	7.50	7.80	8.20
nessen,Pa. P7	7.50	7.80	8.20
wHaven,Conn. A7	7.80	8.10	8.50
tsmouth,O. P12	7.50	7.80	8.20
rrowsPoint,Md. B2	7.60	7.90	8.30
uthers,O. Y1	7.50	7.80	8.20
nton,N.J. A7	7.80	8.10	8.50
nton,N.J. R5	8.00	8.30	8.70
ukegan,Ill. A7	7.50	7.80	8.20
lliamsport,Pa. B2	7.60	7.90	8.30
rcester,Mass. J4	7.50	7.80	8.20

SparrowsPt. B2	9.15	10.65
Struthers Y1	9.05	10.55
Waukegan A7	9.05	10.55

WIRE, Manufacturers Bright, Low-Carbon

AlabamaCity,Ala. R2	4.15
Aliquippa,Pa. J5	4.15
Alton,Ill.(1) L1	4.15
Bartonville,Ill.(1) K4	4.15
Buffalo W12	4.15
Chicago W13	4.15
Cleveland A7, C20	4.15
Crawfrdsvll,Ind. M8	4.30
Donora,Pa. A7	4.15
Duluth A7	4.15
Fairfield,Ala. T2	4.15
Fostoria,O.(24) S1	4.50
Houston S5	4.55
Johnstown,Pa. B2	4.15
Joliet,Ill. A7	4.15
KansasCity,Mo. S5	4.75
Kokomo,Ind. C16	4.25
LosAngeles B3	5.10
Minnequa,Colo. C10	4.50
Monessen,Pa. P7	4.15
Newark,6-8ga. I-1	4.75
No.Tonawanda B11	4.18
Palmer,Mass. W12	4.45
Pittsburg,Calif. C11	5.10
Portsmouth,O. P12	4.15
Rankin,Pa. A7	4.15
So.Chicago,Ill. R2	4.15
So.SanFrancisco C10	5.10
SparrowsPoint,Md. B2	4.25
Sterling,Ill.(1) N15	4.15
Struthers,O. Y1	4.15
Torrance,Calif. C11	5.10
Waukegan,Ill. A7	4.15
Worcester,Mass. A7, T6	4.45

WIRE, MB Spring, High-Carbon

Aliquippa,Pa. J5	5.55
Alton,Ill.(1) L1	5.55
Bartonville,Ill.(19) K4	5.55
Buffalo W12	5.55
Cleveland A7	5.55
Donora,Pa. A7	5.55
Duluth A7	5.55
Fostoria,O. S1	6.05
Johnstown,Pa. B2	5.55
LosAngeles B3	6.50
Milbury,Mass.(12) N6	5.85
Monessen,Pa. P7	5.55
Palmer,Mass. W12	5.85
Pittsburg,Calif. C11	6.50
Portsmouth,O. P12	5.55
So.Chicago,Ill. R2	5.55
SparrowsPoint,Md. B2	5.65
Struthers,O. Y1	5.55
Trenton,N.J. A7	5.85
Trenton,N.J. R5	6.35
Waukegan,Ill. A7	5.55
Worcester A7,J4,T6,W12	5.85

WIRE, Merchant Quality

(6 to 8 gage)	An'ld.	Galv.
Ala.,City, R2	4.80	5.25
Aliquippa J5	4.80	5.25
Atlanta A11	4.90	5.35
Bartnville.(19) K4	4.80	5.25
Cleveland A7	4.80	5.25
Crawfrdvll. M8	4.95	5.40
Donora A7	4.80	5.25
Duluth A7	4.80	5.25
Fairfield T2	4.80	5.25
Houston,Tex. S5	5.20	5.65
Johnstown B2	4.80	5.25
Joliet,Ill. A7	4.80	5.25
KansasCity,Mo. S5	5.40	5.85
Kokomo C16	4.90	5.35
LosAngeles B3	5.75	...
Minnequa C10	5.15	5.60
Monessen P7	4.80	5.25
Pitts.,Cal. C11	5.75	6.20
Portsmth.(18) P12	4.80	5.25
Rankin A7	4.80	5.25
So.Chicago R2	4.80	5.25
So.S.Fran. C10	5.75	6.20
SparrowsPt. B2	4.90	5.35
Sterling,Ill.(1)N15	4.80	5.25
Struthers,O. Y1	4.80	5.25
Torrance,Cal. C11	5.75	...
Worcester A7	5.10	5.55

WIRE, Upholstery Spring

Aliquippa,Pa. J5	5.20
Alton,Ill.(1) L1	5.20
Cleveland A7	5.20
Donora, Pa. A7	5.20
Duluth A7	5.20
Johnstown,Pa. B2	5.20
LosAngeles B3	6.15
NewHaven,Conn. A7	5.50
Pittsburg,Calif. C11	6.15
Portsmouth,O. P12	5.20
So.Chicago,Ill. R2	5.20
SparrowsPoint,Md. B2	5.30
Struthers,O. Y1	5.20
Torrance,Calif. C11	6.15
Trenton,N.J. A7	5.50
Waukegan,Ill. A7	5.20
Worcester,Mass. A7	5.50

WIRE, Barbed

	Col.
AlabamaCity,Ala. R2	123
Aliquippa,Pa. J5	123
Atlanta A11	125
Bartonville,Ill.(19) K4	123
Crawfordsville M8	126
Donora,Pa. A7	123
Duluth,Minn. A7	123
Fairfield,Ala. T2	123
Houston,Tex. S5	131
Johnstown,Pa. B2	123
Joliet,Ill. A7	123
KansasCity,Mo. S5	135
Kokomo,Ind. C16	125
Minnequa,Colo. C10	130
Monessen,Pa. P7	123
Pittsburg,Calif. C11	143
Portsmouth,O.(18) P12	123
Rankin,Pa. A7	123
So.Chicago,Ill. R2	123
So.SanFran.,Calif. C10	143
SparrowsPoint,Md. B2	125
Sterling,Ill.(1) N15	123

FENCE POSTS

	Col.
Duluth A7	112
Huntington,W.Va. W7	112
Johnstown,Pa. B2	112
Joliet,Ill. A7	112
Minnequa,Colo. C10	120
Moline,Ill. R2	116
Williamspt,Pa. S19	n.t.$120

WOVEN FENCE, 9-15½ gage

	Col.
Ala.City,Ala.,17-18ga. R2	175
AlabamaCity,Ala. R2	109
Aliquip.,Pa 9-14½ga. J5	109
Atlanta A11	111
Bartonville,Ill.(19) K4	109
Crawfordsvll,Ind. M8	112
Donora,Pa. A7	109
Duluth A7	109
Houston,Tex. S5	117
Fairfield,Ala. T2	109
Johnstown,Pa. B2	109
Johnstn,17ga.,6" B2	183
Johnstn,17ga.,4" B2	186
Joliet,Ill. A7	109
KansasCity,Mo. S5	121
Kokomo,Ind. C16	111
Minnequa,Colo. C10	116
Monessen,Pa. P7	109
Pittsburg,Calif. C11	132
Portsmouth,O.(18) P12	109
Rankin, Pa. A7	109
So.Chicago,Ill. R2	109
Sterling,Ill.(1) N15	109

BALE TIES, Single Loop

	Col.
AlabamaCity,Ala. R2	106
Atlanta A11	107
Bartonville,Ill.(19) K4	106
Chicago W13	106
Crawfordsville M8	109
Donora,Pa. A7	106
Duluth A7	106
Fairfield,Ala. T2	106
Joliet,Ill. A7	106
Kokomo,Ind. C16	108
Minnequa,Colo. C10	113
Pittsburg,Calif. C11	130
Portsmouth,O.(18) P12	106
So.Chicago,Ill. R2	106
So.SanFran., Calif. C10	130
SparrowsPoint,Md. B2	108
Sterling,Ill.(1) N15	106

NAILS & STAPLES, Stock (To Dealers & Mfrs.)

AlabamaCity,Ala. R2	103
Aliquippa,Pa. J5	103
Atlanta A11	105
Bartonville,Ill.(19) K4	103
Cleveland A9	110
Crawfordsville M8	106
Donora,Pa. A7	103
Duluth A7	103
Fairfield,Ala. T2	103
Houston,Tex. S5	111
Johnstown,Pa. B2	103
Joliet,Ill. A7	103
KansasCity,Mo. S5	115
Kokomo,Ind. C16	105
Minnequa,Colo. C10	110
Monessen,Pa. P7	103
Pittsburg,Calif. C11	122
Portsmouth,O. P12	103
Rankin,Pa. A7	103
So.Chicago,Ill. R2	103
SparrowsPoint,Md. B2	105
Sterling,Ill.(1) N15	103
Torrance,Calif. C11	123
Worcester,Mass. A7	109

NAILS & STAPLES, Stock (To Jobbers)

Chicago,Ill. W13	103
Minnequa,Colo. C10	107
Portsmouth,O. P12	100

NAILS & STAPLES, Non-Stock

AlabamaCity,Ala. R2	5.20
Bartonville,Ill.(19) K4	5.20
Donora,Pa. A7	5.20
Duluth A7	5.20
Johnstown,Pa. B2	5.20
Joliet,Ill. A7	5.20
Kokomo,Ind. C16	5.30
Minnequa,Colo. C10	5.55
Pittsburg,Calif. C11	6.15
Portsmouth,O. P12	5.20
Rankin,Pa. A7	5.20
So.Chicago,Ill. R2	5.20
SparrowsPoint,Md. B2	5.30
Worcester,Mass. A7	5.50

NAILS, Cut (100 lb keg)

Conshohocken,Pa. A3	$6.75
Wheeling,W.Va. W10	6.75

AXLES

Fairfield,Ala. T2	5.20
Gary,Ind. C3	5.20
Ind.Harbor,Ind. S13	5.20
Johnstown,Pa. B2	5.20
McKeesRocks,Pa. C3	5.20

TIE PLATES

Fairfield,Ala. T2	4.05
Gary,Ind. C3	4.05
Ind.Harbor,Ind. I-2	4.05
Lackawanna,N.Y. B2	4.05
Minnequa,Colo. C10	4.05
Pittsburg,Calif. C11	4.20
Pittsburgh R2	4.05
Seattle B3	4.50
Steelton,Pa. B2	4.05
Torrance,Calif. C11	4.20
Weirton,W.Va. W6	4.05

JOINT BARS

Bessemer,Pa. C3	4.25
Fairfield,Ala. T2	4.25
Ind.Harbor,Ind. I-2	4.25
Joliet,Ill. C3	4.25
Lackawanna,N.Y. B2	4.25
Minnequa,Colo. C10	4.25
Steelton,Pa. B2	4.25

TRACK BOLTS (20) Treated

Fairfield,Ala. T2	8.50
Lebanon,Pa. B2	8.50
Minnequa,Colo. C10	8.25
Pittsburgh,Pa. O3, P14	8.50

STANDARD TRACK SPIKES

Fairfield,Ala. T2	5.35
Ind.Harbor,Ind. I-2, Y1	5.35
Lebanon,Pa. B2	5.35
Minnequa,Colo. C10	5.35
Pittsburgh J5	5.35
So.Chicago,Ill. R2	5.35
Struthers,O. Y1	5.35
Youngstown R2	5.35

LIGHT RAILS, Rail Steel

Huntington,W.Va. W7	3.55
Williamsport,Pa. S19	3.55

RAILS	**Std. No. 1**	**Std. No. 2**	**Std. All No. 2**	**TeeRails 60 lb. Under**
Bessemer,Pa. C3	3.20	3.10	3.15	3.55
Ensley,Ala. T2	3.20	3.10	3.15	3.55
Fairfield,Ala. T2	...	...	...	3.55
Gary,Ind. C3	3.20	3.10	3.15	...
Ind.Harbor,Ind. I-2	3.20	3.10	3.15	...
Johnstown,Pa. B2	...	...	...	(16) 3.55
Lackawanna B2	3.20	3.10	...	3.55
Minnequa,Colo. C10	3.20	3.10	...	4.25
Steelton,Pa. B2	3.20	3.10	...	...

TOOL STEEL

Grade	Cents per lb	Grade	Cents per lb
Reg. Carbon	19.00	18W,4Cr,3V	114.50
Extra Carbon	22.00	18W,4Cr,2V,9Co	168.50
Spec. Carbon	26.50	18W,4Cr,2V,6Co	154.00
Oil Hardening	29.00	18.25W,4.25Cr,1V,4.75Co	142.00
Hi.-Carbon-Cr	52.00	20.25W,4.25Cr,1.6V,12.25Co	266.50
Cr Hot Wrk.	29.00	1.5W,4Cr,1V,8.5Mo	65.00
18W,4Cr,1V	90.50	6.4W,4.5Cr,1.9V,5Mo	69.50
18W,4Cr,2V	102.50	6W,4Cr,3V,6Mo	88.00

Tool steel producers include: A4, A8, B2, B8, C4, C9, C13, C18, D4, F2, H4, J3, L3, M9, R2, S8, T7, U4, V2, V3.

Key to Producing Companies

- Lone Star Steel Co.
- Lukens Steel Co.
- McLouth Steel Corp.
- Mahoning Valley Steel
- Medart Co.
- Mercer Tube & Mfg. Co.
- Mid-States Steel & Wire
- Midvale Co.
- Missouri-Illinois Furnace
- Moltrup Steel Products
- Monarch Steel Co.
- National Supply Co.
- National Tube Co.
- Nelsen Steel & Wire Co.
- New Eng.High Carb.Wire
- Newman-Crosby Steel
- Niles Rolling Mill Co.
- Nrthwst. Steel Roll. Mills
- Northwestern S.&W. Co.
- New Delphos Mfg. Co.
- Oliver Iron & Steel Corp.
- Oregon Steel Mills
- Pacific States Steel Corp.
- Pacific Tube Co.
- Pilgrim Drawn Steel
- Pittsburgh Coke & Chem.
- Pittsburgh Steel Co.
- Pittsburgh Tube Co.
- P11 Pollak Steel Co.
- P12 Portsmouth Steel Corp.
- P13 Precision Drawn Steel
- P14 Pitts. Screw & Bolt Co.
- P15 Pittsburgh Metallurgical
- P16 Page Steel & Wire Div., Amer. Chain & Cable
- R1 Reeves Steel & Mfg. Co.
- R2 Republic Steel Corp.
- R3 Rhode Island Steel Corp.
- R5 Roebling's Sons, John A.
- R7 Rotary Electric Steel Co.
- R8 Reliance Div., Eaton Mfg.
- S1 Seneca Wire & Mfg. Co.
- S3 Sharon Steel Corp.
- S5 Sheffield Steel Corp.
- S6 Shenango Furnace Co.
- S7 Simmons Co.
- S8 Simonds Saw & Steel Co.
- S9 Sloss-Sheffield S.&I. Co.
- S13 Standard Forgings Corp.
- S14 Standard Tube Co.
- S15 Stanley Works
- S16 Struthers Iron & Steel
- S17 Superior Drawn Steel Co.
- S18 Superior Steel Corp.
- S19 Sweet's Steel Co.
- T2 Tenn. Coal, Iron & R.R.
- T3 Tenn. Prod. & Chem.
- T4 Texas Steel Co.
- T5 Thomas Steel Co.
- T6 Thompson Wire Co.
- T7 Timken Roller Bearing
- T9 Tonawanda Iron Div. Am. Rad. & Stan. San.
- U4 Universal-Cyclops Steel
- V2 Vanadium-Alloys Steel
- V3 Vulcan Crucible Steel Co.
- W1 Wallace Barnes Co.
- W2 Wallingford Steel Co.
- W3 Washburn Wire Co.
- W4 Washington Steel Corp.
- W6 Weirton Steel Corp.
- W7 W. Va. Steel & Mfg. Co.
- W8 Wstrn.Auto.Mach.Screw
- W9 Wheatland Tube Co.
- W10 Wheeling Steel Corp.
- W12 Wickwire Spencer Steel Div., Colo. Fuel & Iron
- W13 Wilson Steel & Wire Co.
- W14 Wisconsin Steel Co.
- W15 Woodward Iron Co.
- W16 Worth Steel Co.
- W18 Wyckoff Steel Co.
- Y1 Youngstwn. Sheet & Tube

(1) Chicago Base. (2) Angles.
(3) Merchant. (4) Reinforcing.
(5) Philadelphia del.
(6) Chicago or Birm. Base.
(8) 16 gage and heavier.
(9) 6" and narrower.
(10) Pittsburgh Base.
(11) Cleveland & Pittsburgh Base.
(12) Worcester, Mass. Base.
(13) 3" & wider; over ½" to under 3" 5.50c.
(14) Also wide flange beams.
(15) ½" and thinner.
(16) 40 lb and under.
(17) Flats only.
(18) To dealers.
(19) Chicago & Pittsburgh Base.
(20) Deduct 0.25c for untreated.
(21) New Haven, Conn. Base.
(22) Del. San Fran. Bay area.
(23) Angles 1"x1" to 1¾"x1¾" only.
(24) Deduct 0.35c for finer than 15 Ga.

STANDARD PIPE, T. & C.

BUTTWELD Size Inches	List Per Ft	Pounds Per Ft	Carload Discounts from List, % Black A	Black B	Black C	Galvanized D	Galvanized E	Galvanized F
⅛	5.5c	0.24	41.5	39.5	38.5	13.5	11.5	10.5
¼	6.0	0.42	39.5	37.5	36.5	15.5	13.5	12.5
⅜	6.0	0.57	36	34	33	12.5	10.5	9.5
½	8.5	0.85	43	41	42	26.5	24.5	25.5
¾	11.5	1.13	46	44	45	30.5	28.5	29.5
1	17.0	1.68	48.5	46.5	47.5	33.5	31.5	32.5
1¼	23.0	2.28	49	47	48	34	32	33
1½	27.5	2.73	49.5	47.5	48.5	34.5	32.5	33.5
2	37.0	3.68	50	48	49	35	33	34
2½	58.5	5.82	50.5	48.5	49.5	35.5	33.5	34.5
3	76.5	7.62	50.5	48.5	49.5	35.5	33.5	34.5

Column A: Etna, Pa. N2; Monaca, Pa. P9; Sharon, Pa. M6; Butler, Pa. ⅛-⅜", F6; Benwood, W. Va. 1½ percentage point lower on ⅛", 2 points lower on ¼", 3 points lower ⅜", W10; Wheatland, Pa., 2 points lower on ⅛ through ⅜", W9. Following make ½ through 3" only: Lorain, O. N3; Youngstown R2, Y1; Aliquippa, Pa. J5. Fontana, Calif., K1 quotes 11 points lower on ½" through 3".

Columns B & E: Sparrows Point, Md. B2; Wheatland, Pa., ⅛ through ⅜", W9.

Columns C & F: Alton, Ill. (Lorain, O. Base) LI; Indiana Harbor, Ind., ½ through 3", Y1.

Column D: Etna, Pa. N2; Monaca, Pa. P9; Sharon, Pa. M6; Butler, Pa., ⅛ through ⅜", F6; Benwood, W. Va., except 3½ points lower on ⅛", 2½ pts on ¼", 3 pts on ⅜" W10; Wheatland, Pa., except 2 pts lower on ⅛ through ⅜" W9. Following make ½ through 3" only; Lorain N3; Youngstown R2, Y1; Aliquippa, Pa. J5. Fontana, Calif., K1 quotes 11 points lower on ½" through 3".

SEAMLESS AND ELECTRIC WELD Size Inches	List Per Ft	Pounds Per Ft	Carload Discounts from List, % Seamless Black A	Seamless Galv. B	Elec. Weld Black C	Elec. Weld Galv. D
2	37.0c	3.68	38.5	23	38.5	23
2½	58.5	5.82	41.5	26	41.5	26
3	76.5	7.62	41.5	26	41.5	26
3½	92.0	9.20	43.5	28	43.5	28
4	$1.09	10.89	43.5	28	43.5	28
5	1.48	14.81	43.5	28	43.5	28
6	1.92	19.18	43.5	28	43.5	28

Column A: Aliquippa J5; Ambridge N2; Lorain N3; Youngstown Y1.

Column B: Aliquippa J5; Lorain, O. N3; Youngstown Y1.

Columns C & D: Youngstown R2.

BOILER TUBES

Net base c.l. prices, dollars per 100 ft, mill; minimum wall thickness, cut lengths 4 to 24 in., inclusive.

O.D. In.	B.W. Ga.	Seamless H.R.	Seamless C.D.	Elec. Weld H.R.	Elec. Weld C.D.
1	13	11.50	13.39	13.00	13.00
1¼	13	13.62	15.87	13.21	15.39
1½	13	15.05	17.71	14.60	17.18
1¾	13	17.11	20.15	16.60	19.54
2	13	19.18	22.56	18.60	21.89
2¼	13	21.37	25.16	20.73	24.40
2½	12	23.54	27.70	22.83	26.88
2½	12	25.79	30.33	25.02	29.41
2¾	12	27.33	32.14	26.51	31.18
3	12	28.68	33.76	27.82	32.74
3¼	11	33.39	39.29	32.39	38.11
3½	11	35.85	42.20	34.78	40.94
4	10	44.51	52.35	43.17	50.78
4½	9	58.99	69.42	....	....
5	9	68.28	80.35	....	....
6	7	104.82	123.33	....	....

Boiler tube producers include Babcock & Wilcox Tube Co., National Tube Co., Globe Steel Tubes Co., Pacific Tube Co., Pittsburgh Steel Co., Republic Steel Corp., Standard Tube Co.

CLAD STEELS

(cents per pound)

Stainless-Clad	PLATES Carbon Base 10%	PLATES Carbon Base 20%	SHEETS Carbon Base 10%	SHEETS Carbon Base 20%	SHEETS Copper Base Both Sides Clad
302	....	....	19.75	21.50	75.00
304	22.50	26.50	20.75	22.50	77.00
305	....	....	....	....	79.00
309	27.00	31.00	....	....	....
310	32.50	36.50	....	....	105.00
316	27.00	31.00	26.00	28.00	....
317	30.50	34.50	....	....	....
318	29.50	33.50	....	....	....
321	23.50	27.50	23.00	25.00	90.00
347	25.00	29.00	24.00	26.00	94.00
405	18.75	24.75	....	....	....
410	18.25	24.25	....	....	....
430	18.25	24.25	....	....	....
Nickel-Clad	27.50	34.50	....	....	88.00
Inconel-Clad	36.00	46.00	....	....	115.00
Monel-Clad	29.00	37.00	....	....	83.00

Production points for carbon base products are: Stainless-clad plates and sheets, Conshohocken, Pa. A3 and New Castle, Ind. I-4; stainless-clad plates Claymont, Del. W16 and Coatesville, Pa. L7; nickel, inconel and monel-clad plates, Coatesville. Production point for copper-base products is Carnegie, Pa. A13.

BOLTS, NUTS

(To consumers)

F.o.b. midwestern plants. Additional discounts on carriage, machine bolts, 5 for cl; 15 for full containers, except tire and plow bolts.

CARRIAGE, MACHINE BOLTS

(Per cent off list)

½-in., smaller; up to 6 in. long 35
⅝ & ⅞ x 6 in., shorter. 37
⅝-in. & larger x 6 in., shorter 34
All diameters longer than 6-in. 30
Tire bolts 25
Plow bolts 47
Lag bolts, 6 in., shorter 37
Lag bolts, longer than 6 in. 35

NUTS

Semifinished hexagon	A.S. Light	Reg. & Heavy
⅞-in., smaller	41 off	.....
½-in., smaller	....	38 off
½-in.-1-in.	....39 off	.....
⅝-in.-1-in.	....	37 off
1⅛-in.-1½-in.	.37 off	35 off
1⅝-in., larger	.34 off	28 off

Additional discount of 15 for full containers.

STOVE BOLTS

In packages, nuts separate, 58½-10 off; bulk 70 off on 15,000 of 3-in. and shorter, or 5000 over 3 in., nuts separate.

SQUARE HEAD SET SCREWS

Upset 1-in. & smaller..51 off
¾, ⅞, & 1 x 6-in. & shorter ....35 off
Headless, ¼-in., larger..31 off

HEXAGON CAP SCREWS

(Packaged)

Upset 1-in. smaller by 6-in. and shorter (1020 bright) ..... 46 off
Upset (1035 heat treated) ⅝ and smaller x 6 and shorter ..... 40 off

RIVETS

F.o.b. midwestern plants
Structural ½-in., larger 6.75c
7/16-in., under .....48 off

WASHERS, WROUGHT

F.o.b. shipping point, to jobbers .....Net to $1 off

ELECTRODES

(Threaded, with nipples, unboxed, f.o.b. plant)

GRAPHITE

Inches Diam.	Length	Cents per lb.
17,18,20	60,72	16.00
8 to 16	48,60,72	16.50
7	48,60	17.75
6	48,60	19.00
4,5⅛	40	19.50
3	40	20.50
2½	24,30	21.00
2	24,30	23.00

CARBON

40	100,110	7.50
35	100,110	7.50
30	84,110	7.50
24	72 to 104	7.50
17 to 20	84,90	7.50
14	60,72	8.00
10,12	60	8.25

FLUORSPAR

Metallurgical grade, f.o.b. shipping point, in Ill., Ky., net tons, carloads, effective CaF_2 content, 70% or more, $37; less than 60%, $34.
Imported, net ton, duty paid, metallurgical grade, $39-$40.

STAINLESS STEEL

Type	Sheets	C.R. Strip	Bars Wire Structurals
301	37.50	30.50	28.50
302	37.50	33.00	28.50
303	39.50	36.50	31.00
304	39.50	35.00	30.00
309	52.00	52.00	41.50
316	53.00	55.00	46.00
321	45.50	44.50	34.00
347	50.00	48.50	38.50
410	33.00	27.00	23.00
416	33.50	33.50	23.50
420	40.50	43.50	28.50
430	35.50	27.50	23.50
501	24.00	22.50	11.50
502	25.00	23.50	12.50

Baltimore, Types 301 through 347 sheets, except 309 E2
Baltimore, bars, wire and structurals A10
Brackenridge, Pa., sheets A4
Bridgeville, Pa., bars, wire, sheets & strip, except Type 309 strip quoted 51.00c U4
Butler, Pa., sheets and strip except Types 309, 501 & 502 A10
Carnegie, Pa., strip except Type 416; Type 309 strip quoted 51.00c S18
Cleveland, strip, except Type 309 quoted 51.00c, and except Type 416 A7
Detroit, strip, except Type 309 quoted 51.00c M1
Dunkirk, N.Y., bars, wire A4
Duquesne, Pa., bars C3
Gary, Ind., sheets except Type 416 C3
Harrison, N. J., strip C18
Massillon, all products, except Type 309 bars, wire & structurals quoted 42.00c, Type 501 10.50c, Type 502 11.50c R2
McKeesport, Pa., bars; sheets except Type 416, C3
McKeesport, Pa., bars & wire except Types 301, 309, 501 & 502; strip Types 410 & 430 only F2
Middletown, O., sheets and strip, except Types 501 and 502 and except 309 strip quoted 51.00c A10
Midland, sheets & strip C18
Munhall, Pa., bars C3
Pittsburgh, sheets C18
Reading, Pa., bars & strip except Type 309 bars quoted 42.00c C4
So. Chicago, Ind., bars & structurals C3
Syracuse, N. Y., bars, wire & structurals C18
Titusville, Pa., bars U4
Wallingford, Conn., strip W2
Washington, Pa., bars, sheets & strip except Type 309 strip quoted 51.00c J3
Washington, Pa., Types 301 through 347 sheets & strip except 303 & 309; 316 sheets 58.00c strip 60.00c W4
Watervliet, N. Y., structurals & bars A4
Waukegan, bars & wire A7
West Leechburg, Pa., strip, except Type 309 quoted 51.00c A4
Youngstown, strip C8.

COAL CHEMICALS

Spot, cents per gallon, ovens
Pure benzol 20.00
Toluol, one deg. ..19.00-23.50
Industrial xylol ..20.50-26.50

Per ton bulk, ovens

Sulphate of ammonia..$45.00

Per pound, ovens

Phenol, 40 (carlots, returnable drums) 13.25
Do., less than carlots..14.00
Do., tank cars 12.50

ORES

LAKE SUPERIOR IRON OR

Gross ton, 51½% (natura
lower lake ports. Any
crease or decrease in R
freight rates, dock handl
charges and taxes ther
are for buyer's account.
Old range bessemer ...$
Old range nonbessemer.
Mesabi bessemer .....
Mesabi nonbessemer ...
High phosphorus .....

EASTERN LOCAL ORE

Cents, unit, del. E. Pa
Foundry and basic 56.62%
concentrates, contract.16

FOREIGN ORE

Cents per unit, c.i.f. Atl
tic ports
Swedish basic, 60 to 68%
Spot: 17
Long-term contract..15
Brazil iron ore, 68-69%.18

TUNGSTEN ORE

Wolframite, scheelite, net
ton unit, duty pd.. $20-

MANGANESE ORE

Long term contracts, no
inal; nearby, 48%, d
paid, 81.8c-83.8c per long
unit, c.i.f. U.S. ports; pri
on lower grades adjusted
Mn content and impuritie

CHROME ORE

Gross ton f.o.b. cars, n
York, Philadelphia, Ba
more, Charleston, S. C., p
ocean freight differential
delivery to Portland, Ore
or Tacoma, Wash.
Indian and African
48% 2.8:1 .....$35
48% 3:1 37
48% no ratio.....28.50-29
South African Transvaal
44% no ratio....$19.00-20
45% no ratio.....19.50-21
48% no ratio.....27.00-28
50% no ratio.....28.50-29
Brazilian
44% 2.5:1 lump.....$32
Rhodesian
45% no ratio....$20.00-21
48% no ratio.....28.00-29
48% 3:1 lump 37
Domestic—rail nearest sell
48% 3:1 .....$39

MOLYBDENUM

Sulphide conc., lb, Mo,
cont. Mines $0

METALLURGICAL CO

Price per Net Ton

BEEHIVE OVENS

Connellsvil, fur. $13.00-13
Connellsvil, fdry. 15.50-16
New River, foundry ..18
Wise county, foundry 15
Wise county, furnace 14

OVEN FOUNDRY COKE

Kearny, N. J., ovens $22
Everett, Mass., ovens ..
New England, del.‡ .22
Chicago, ovens 20
Chicago, del. .....†21
Detroit, del. 23
Terre Haute, ovens...20
Milwaukee, ovens 20
Indianapolis, ovens ...19
Chicago, del. 23
Cincinnati, del. 22
Detroit, del. 23
Ironton, O., ovens ...19
Cincinnati, del. 21
Painesville, O., ovens 20
Buffalo, del. 23
Cleveland, del. 22
Erie, del. 21
Birmingham, ovens ...17
Philadelphia, ovens ...20
Swedeland, Pa., ovens 20
Portsmouth, O., ovens 19
Detroit, ovens 20
Detroit, del. *21
Buffalo, del. 22
Flint, del. 23
Pontiac, del. 21
Saginaw, del. 23

Includes represen
tive switching charge
*, $1.05; †, $1.45. one-tr
charge being $1.20, t
tracks $1.40. and three
more tracks $1.50.
within $4.03 freight z
from works.

WAREHOUSE STEEL PRODUCTS

(Prices, cents per pound, for delivery within switching limits, subject to extras)

	SHEETS			STRIP		BARS			Standard Structural Shapes	PLATES	
	H.R. 18 Ga., Heavier*	C.R. 15 Ga.	Galv. 10 Ga.†	H.R.*	C.R.*	H.R. Rds.	C.F. Rds.	H.R. Alloy 4140§		Carbon	Floor
w York (city)	5.60	6.51	7.10	5.82	...	5.77	6.31	8.28	5.53	5.85	7.36
w York(c'try)	5.40	6.31	6.90	5.62	...	5.57	6.11	8.08	5.33	5.65	7.16
ston (city) ..	5.75	6.75**	7.16	5.80	...	5.72	6.22	8.77	5.62	5.95	7.45
ston (c'try) .	5.55	6.55**	6.96	5.60	...	5.52	6.02	8.57	5.42	5.75	7.25
la. (city)...	5.90	6.49	6.88	5.65	...	5.65	6.21	8.10	5.35	5.60	6.80
lla. (c'try) ..	5.65	6.24	6.63	5.40	...	5.40	5.96	7.85	5.10	5.35	6.55
t. (city)....	5.46	6.36	6.81	5.52	...	5.57	6.05	...	5.51	5.71	7.16
t. (c'try)...	5.31	6.21	6.66	5.37	...	5.42	5.91	...	5.36	5.56	7.01
rfolk, Va. ..	5.80‡	...	...	...	...	6.05	7.05	...	6.05	6.05	7.55
sh. (w'hse).	6.07‡	...	...	5.83	...	5.88	6.62	...	5.82	6.02	7.47
ffalo (del.)..	5.00‡	5.90	7.57	5.39	6.42	5.10	5.60	10.13	5.15	5.50	7.06
ffalo (w'hse)	4.85‡	5.75	7.42	5.24	6.27	4.95	5.40	9.60	5.00	5.35	6.91
ts. (w'hse)..	4.85	5.75[4]	6.80	5.00	6.00	4.90	5.40	9.20††	4.90	5.05	6.55
roit (w'hse).	5.32	6.22[4]	7.35	5.42	6.42-6.73	5.48	5.90	8.44-8.59	5.48	5.67	7.02
veland (del.)	5.00	5.90	6.70	5.15-5.18	6.15	5.15-5.16	5.60	7.84-8.00	5.15-5.16	5.35-5.36	6.80-6.81
ve. (w'hse) .	4.85	5.75	6.55	5.00-5.03	6.00	5.00-5.01	5.45	7.84-7.85	5.00-5.01	5.20-5.21	6.65-6.66
cin. (w'hse).	5.27‡	5.94**	6.83	5.39	6.10	5.44	5.95	...	5.44	5.64	7.05
cago (city) .	5.05	5.95[4]	7.05	5.05	6.35-6.85	5.10	5.60	7.90[5]	5.10	5.30	6.75
cago (w'hse)	4.85	5.75[4]	6.85	4.85	6.15-6.65	4.90	5.40	7.70[5]	4.90	5.10	6.55
waukee (city)	5.18	6.08[4]	7.18	5.18	6.48-6.98	5.23	5.78	8.03[5]	5.23	5.43	6.88
wau. (c'try).	5.03	5.93[4]	7.03	5.03	6.33-6.83	5.08	5.63	7.88[5]	5.08	5.28	6.73
Louis (del.)	5.37	6.27[4]	7.44	5.34	6.64	5.39	6.19[6]	6.64	5.39	5.59	7.04
L. (w'hse) .	5.22	6.12[4]	7.29	5.19	6.49	5.24	6.04[6]	6.49	5.24	5.44	6.89
m'ham (city)	5.00	5.90	6.55	5.00	...	5.00	6.83	...	5.05	5.25	7.69
m'ham(c'try)	4.85	5.75	6.40	4.85	...	4.85	6.68	...	4.90	5.10	7.54
aha, Nebr...	6.13‡	...	8.33	6.13	...	6.18	6.98	...	6.18	6.38	7.83
s Ang. (city)	5.60	7.15	7.60	6.10	7.75	5.75	7.40	...	5.60	5.85	7.90
A. (w'hse)..	5.45	7.00	7.45	5.95	7.60	5.60	7.25	...	5.45	5.50	7.75
n Francisco..	6.15[10]	7.50[8]	7.80	6.75[10]	8.25[8]	5.90[10]	7.55	10.85[2]	5.90	6.35	8.10
ttle-Tacoma.	6.70†‡	8.15[8]	8.80	6.70[7]	...	6.20[7]	8.15[1]	10.10	6.00[7]	6.35[7]	8.40[7]

* Prices do not include gage extras; † prices include gage and coating extras, except Birmingham (coating extra excluded) and Los Angeles (gage extra excluded); § as rolled; ** 17 gage; †† as annealed. Base quantities: 400 to 1999 lb except as noted: Cold-rolled strip, 2000 lb and over; cold-finished bars, 1000 lb and over; galvanized sheets, 450 lb to 1499 lb; [1]—1500 lb and over; [2]—1000 to 4999 lb; [3]—450 to 1499 lb; [4]—400 to 1499 lb; [5]—1000 to 1999 lb; [6]—1000 lb and over; [7]—300 to 999 lb; [8]—1500 to 1999 lb; [9]—400 to 3999 lb; [10]—400 lb and over; [11]—500 to 1499 lb.

REFRACTORIES

(Prices per 1000 bricks, f.o.b. plant)

FIRE CLAY BRICK

per Duty: St. Louis, Vandalia, Farber, xico, Mo., Olive Hill, Ky., Clearfield, or rwensville, Pa., Ottawa, Ill., $100. Hard-d, $135 at above points.

gh-heat Duty: Salina, Pa. $85; Woodbridge, J., St. Louis, Farber, Vandalia, Mexico, .., West Decatur, Orviston, Clearfield, Beach eek, or Curwensville, Pa., Olive Hill, chins, Haldeman, or Ashland, Ky., Troup, Athens, Tex., Stevens Pottery, Ga., Ports-uth, or Oak Hill, O., Ottawa, Ill., $80.

rmediate-Heat Duty: St. Louis, or Van-lia, Mo., West Decatur, Orviston, Beach eek, or Clearfield, Pa., Olive Hill, Hitchins, Haldeman, Ky., Athens, or Troup, Tex., evens Pottery, Ga., Portsmouth, O., Ottawa, $74.

o-Heat Duty: Oak Hill, or Portsmouth, O., earfield, Orviston, Pa., Bessemer, Ala., Ot-wa, Ill., $66.

LADLE BRICK

Press: $55, Freeport, Merill Station, earfield, Pa., Chester, New Cumberland, Va.; Irondale, Wellsville, O.

re Cut: $53, Chester, New Cumberland, Va.; Wellsville, O.

MALLEABLE BUNG BRICK

Louis. Mo., Olive Hill, Ky., Ottawa, Ill.,); Beach Creek, Pa., $80.

SILICA BRICK

. Union, Claysburg, or Sproul, Pa., Ensley, a., $80; Hays, Pa., $85; Joliet or Rockdale, , E. Chicago, Ind., $89; Lehi, Utah, Los geles, $95.

stern Silica Coke Oven Shapes: Claysburg, Union, Sproul, Pa., Birmingham, $80.

nois Silica Coke Oven Shapes: Joliet or ckdale, Ill., E. Chicago, Ind., Hays, Pa., .

BASIC BRICK

ase prices per net ton; f.o.b. works, Balti-more or Chester, Pa.)

rned chrome brick, $66; Chemical-bonded rome brick, $69; magnesite brick, $91; emical-bonded magnesite, $80.

MAGNESITE

(Base prices per net ton, f.o.b. works, Chewelah, Wash.)

nestic dead-burned, ⅜" grains; Bulk, .50-$31; single paper bags, $35-$35.50.

DOLOMITE

(Base prices per net ton)

nestic, dead-burned bulk; Billmeyer, Blue . Williams, Plymouth Meeting, Pa., Mill-. W. Va., Narlo, Millersville, Martin, sburg, Woodville, O., $12.25; Thornton, ook, Ill., $12.35; Dolly Siding, Bonne e Mo., $12.45

LEADING FERROALLOY PRODUCTS

Manganese Alloys

Spiegeleisen: (19-21% Mn, 1-3% Si) Carlot per gross ton, $65, Palmerton, Pa.; $66, Pittsburgh and Chicago; (16% to 19% Mn) $1 per ton lower.

Standard Ferromanganese: (Mn 78-82%, C 7% approx.) Carload, lump, bulk $172 per gross ton of alloy, c.l., packed, $184; gross ton lots, packed, $199; less gross ton lots, packed, $216; f.o.b. Alloy, W. Va., Niagara Falls, N. Y., or Welland, Ont. Base price: $174, f.o.b. Birmingham and Johnstown, Pa., furnaces; $172, Sheridan, Pa.; $175, Etna, Pa. Shipment from Pacific Coast warehouses by one seller add $33 to above prices, f.o.b. Los Angeles, San Francisco, Portland, Oreg. Shipment from Chicago warehouse, ton lots, $214; less gross ton lots, $231 f.o.b. Chicago. Add or subtract $2.15 for each 1% or fraction thereof, of contained manganese over 82% and under 78%, respectively.

Low-Carbon Ferromanganese, Regular Grade: (Mn 80-85%). Carload, lump, bulk, max. 0.10% C, 24.75c per lb of contained Mn, carload packed 25.5c, ton lot 26.6c, less ton 27.8c. Delivered. Deduct 0.5c for max. 0.15% C grade from above prices, 1c for max. 0.30% C, 1.5c for max. 0.50% C, and 4.5c for max. 75% C—max. 7% Si. **Special Grade:** (Mn 90% approx., C 0.07% max., P 0.06% max.). Add 0.5c to above prices. Spot, add 0.25c.

Medium-Carbon Ferromanganese: (Mn 80-85%, C 1.5% max., Si 1.5% max.). Carload, lump, bulk 18.15c per lb of contained Mn, carload packed 18.9c, ton lot 20.0c, less ton 21.2c. Delivered. Spot, add 0.25c.

Manganese Metal: (Mn 96% min., Fe 2% max., Si 1% max., C 0.20% max.). Carload 2" x D, packed 35.5c per lb of metal, ton lot 37c, less ton 39c. Delivered. Spot, add 2c.

Manganese, Electrolytic: Less than 250 lb, 35c; 250 lb to 1999 lb, 32c; 2000 to 35,999 lb, 30c; 36,000 lb or more, 28c. Premium for hydrogen-removed metal 1.5c per pound, f.o.b. cars Knoxville, Tenn., freight allowed to St. Louis or to any point east of Mississippi.

Silicomanganese: (Mn 65-68%). Contract, lump, bulk, 1.50% C grade, 18-20% Si, 8.95c per lb of alloy, carload packed, 9.70c, ton lot 10.60c, less ton 11.60c. Freight allowed. For 2% C grade, Si 15-17.5%, deduct 0.2c from above prices. Spot, add 0.25c.

Chromium Alloys

High-Carbon Ferrochrome: Contract, c.l., lump, bulk, 20.5c per lb of contained Cr, c.l., packed 21.4c, ton lot 22.55c, less ton 23.95c. Delivered. Spot, add 0.25c.

"SM" High-Carbon Ferrochrome: (Cr 60-65%, Si 4-6%, Mn 4-6%, C 4-6%). Add 1.1c to high-carbon ferrochrome prices.

Foundry Ferrochrome: (Cr 62-66%, C 5-7%). Contract, c.l., 8MxD, bulk 22.0c per lb of contained Cr, c.l., packed 22.9c, ton 24.25c, less ton 26.0c. Delivered. Spot, add 0.25c.

Low-Carbon Ferrochrome: (Cr 67-72%). Contract, carload, lump, bulk, max. 0.03% C 31.85c per lb of contained Cr, 0.04% C 29.75c, 0.06% C 28.75c, 0.10% C 28.25c-28.5c, 0.15% C 28.0c, 0.20% C 27.75c, 0.50% C 27.5c, 1% C 27.25c, 1.50% C 27.1c, 2% C 27.0c. Carload packed add 1.1c, ton lot add 2.2c, less ton add 3.9c. Delivered. Spot, add 0.25c.

"SM" Low-Carbon Ferrochrome: (Cr 62-66%, Si 4-6%, Mn 4-6%, C 0.75-1.25% max.). Contract, carload, lump, bulk 27.75c per lb of contained chromium, carload, packed 28.85c, ton lots 30.05c, less ton 31.85c. Delivered. Spot, add 0.25c.

Low-Carbon Ferrochrome, Nitrogen Bearing: Add 5c to 0.10% C low-carbon ferrochrome prices for approx. 0.75% N. Add 5c for each 0.25% of N above 0.75%.

Chromium Metal: (Min. 97% Cr and 1% Fe). Contract, carload. 1" x D; packed, max 0.50% C grade, $1.03 per lb of contained chromium, ton lot $1.05, less ton $1.07. Delivered. Spot, add 5c.

Silicon Alloys

25-30% Ferrosilicon: Contract, carload, lump, bulk, 17.00c per lb of contained Si; packed 18.40c; ton lot 19.50c, f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed.

50% Ferrosilicon: Contract, carload, lump, bulk, 11.3c per lb of contained Si, carload packed 12.9c, ton lot 14.35c, less ton 16c. Delivered. Spot, add 0.45c.

Low-Aluminum 50% Ferrosilicon: (Al 0.40% max.) Add 1.3c to 50% ferrosilicon prices.

75% Ferrosilicon: Contract, carload, lump, bulk, 13.5c per lb of contained Si, carload packed 14.8c, ton lot 15.95c, less ton 17.2c. Delivered. Spot, add 0.8c.

80-90% Ferrosilicon: Contract, carload, lump, bulk, 14.65-15.00c per lb of contained Si, carload packed 15.9c, ton lot 16.9c, less ton 18.05c. Delivered. Spot, add 0.25c.

Low-Aluminum 85% Ferrosilicon: (Al 0.50% max.) Add 0.7c to 85% ferrosilicon prices.

90-95% Ferrosilicon: Contract, carload, lump, bulk, 16.5c per lb of contained Si, carload packed 17.7c, ton lot 18.65c, less ton 19.7c. Delivered. Spot, add 0.25c.

Low-Aluminum 90-95% Ferrosilicon: (Al 0.50% max.). Add 0.7c to above 90-95% ferrosilicon prices.

(Please turn to page 208)

Zinc and Copper Sales Increase

Prime western prices advance to 9.75c, East St. Louis, as steel mills re-enter market. Copper suppliers allocate tonnages to assure equitable distribution; prices tend upward

New York — Anticipating an early end to the strike, steel mills are buying zinc in substantial quantities. This resulted in a further advance in prime western prices to the basis of 9.75c, East St. Louis. Agreement between the steelworkers' union and Bethlehem Steel Co. (second largest tin plate manufacturer) failed to stimulate activity in the tin market, however. Offerings of grade A tin for prompt delivery at 94.00c are not being fully absorbed, despite the comparatively small tonnages available at that level, 1-cent under RFC's selling prices.

Demand for copper remains heavy, sustaining that market on a strong price basis at 17.62½-18.50c , delivered Connecticut, for electrolytic. Phelps Dodge Corp. raised its price ⅞-cent a pound, effective Nov. 3, to 18.50c. The former price had been in effect since July 11. Other leading producers were expected momentarily to take similar action in view of the heavy demand.

Strength in copper and zinc has not spread to the lead market, although it remains firm at 12.80c, St. Louis. Bookings are in only moderate volume.

Zinc—Price of 9.75c for prime western compares with 9.25c immediately prior to the shutdown of principal galvanizing lines and with 17.50c for most of the first quarter of this year.

In addition to the resumption of buying by the steel companies, the upward swing in prices is attributed also to the loss of over 15,000 tons a month due to strikes at plants in Palmerton and Donora, Pa., and at the Bunker Hill smelter. The shortage of coal is an increasingly serious threat to the maintenance of operations at many of the zinc smelteries and refineries.

Brass mills and die casters are buying substantial tonnages of special high-grade zinc.

Copper—The more promising outlook for early settlement of the steel strike has served to stimulate copper consumers' interest in covering future needs. Threat of strikes at copper producing plants has also stimulated purchases.

Demand has been heavy for several weeks and now has reached the point where suppliers are forced to allocate their tonnages to assure equitable distribution among their customers. Some producers have sold more for November delivery than they will produce and will make up the difference by drawing on reserve stocks that had been accumulated earlier in the year. Sales made in October for current shipment and for future delivery totaled more than 122,000 tons. Sales booked for October shipment indicate deliveries for the month amounted to around 115,000 tons, including carryover from the previous month.

Lead—Lead producers are booking a satisfactory volume of business with sales occasionally exceeding daily intake of ore and scrap. This shows a slight improvement over bookings for October shipment which were about 23,000 tons under those for September. The latter month is usually an active period in the lead market. Battery makers and cable manufacturers are the chief buyers at present. Prices held steady on the basis of 12.80c, St. Louis, for the common grade.

Tin—Bi-lateral negotiations, aiming at the acquisition of tin by the United States government, will be resumed in the near future, according to reports being received here from Brussels. Negotiations are expected to be carried on separately with the British, Belgian and Dutch authorities.

STEEL's Metal Price Averages for Oct., 1949

(Cents per pound)

Electrolytic Copper, Del. Conn.	17.625
Lead, St. Louis	13.242
Prime, Western Zinc, E. St. Louis	9.317
Straits Tin, New York	95.505
Primary Aluminum Ingots, del.	17.000
Antimony, f.o.b. Laredo, Tex.	32.000
Nickel, f.o.b. refinery	40.000
Silver, New York	73.250

In the meantime, sales are being transacted on the open market well below RFC's selling prices which are based on 95.00c for spot delivery of grade A metal. Small lot sales of grade A tin were reported as low as 93.75c, although the market generally was considered 94.00c on representative sales. Grade A tin for November arrival was quoted nominally 93.00c.

Output of refined tin by the Longhorn smelter at Texas City, Tex., amounted to 2964 tons in October compared with 2910 tons in September and 2300 tons in October, 1948, reports the Office of Domestic Commerce. This brought the total for the first 10 months to 30,268 tons compared with 30,617 tons in the like period a year ago and 27,502 tons two years ago.

Since the British Ministry of Supply and RFC have made no change in their selling prices, the Bolivian producers will receive settlement for deliveries made in October at 91.00c, f.a.s. South American ports which is the basis of 95.00c for Grade A tin at New York. Producers in Malaya and Nigeria will reecive tentative settlements from the British Ministry of Supply on the basis of about 75.00c to 76.00c for Grade A at New Yo on tin concentrates tendered betwe Sept. 18 and Nov. 15.

General Bronze Buys Brach Mf

New York—General Bronze Co has acquired the business of L. Brach Mfg. Corp., Newark, N. and will operate it as a division. S. Saphier, president of Gener Bronze, says the acquired compa has been in operation for the pa 43 years producing equipment for t automotive, railroad, radio and tel vision industries.

Tin Plate Output Turns Upwar

Pittsburgh—About 35 per cent tin mill facilities will be in operati with resumption of production sche ules by Bethlehem Steel; Weirton a Granite City have been operati throughout the strike period. T plate producers have relatively li tle inventory to help relieve cust mers' depleted stocks when full o erations are resumed. It is estimat that capacity tin plate output c not be achieved much under t weeks following termination of strik

Cuts Power to Aluminum Plant

Portland—Bonneville Power A ministration has ordered 70,000 kw cut off the allowance for Alcoa plant at Vancouver, Wash. and t Spokane plant of Permanente Meta Corp. This action was prompted b continued low flow of the Columb river and increasing winter pow loads on the Bonneville system. T cutback is effective as soon as po lines can be taken out of service. T 70,000 kws is the excess being d livered over contract agreements. the total, 42,200 kws apply to Alco 27,800 to Permanente.

Britain Raises Zinc Prices

London — Ministry of Supply a vanced its selling prices of zinc consumers in the United Kingdom £ per ton, effective Nov. 3, to the bas of £85 10s for Prime Western a other good ordinary brands.

At $2.80 for the pound sterling th is equal to 10.69c a pound, U. S. cu rency. The new United Kingdo prices, delivered consumer's plan are as follows:

Good ordinary brand, foreign, (dut paid) £85 10s 0d (10.69c); domesti £85 10s 0d (10.69c); "prime western £85 10s 0d (10.69c); refined and ele trolytic, £86 5s 0d (10.78c); not u der 99.99%, £87 15s Od (10.97c).

Canadian Zinc Prices Rise

Montreal—Consolidated Mining Smelting Co. of Canada Ltd. a vanced zinc prices ½-cent a pou last week. Prices advanced ¼-ce on Oct. 31 and a like amount Nov. making the new price schedul Prime western, 10.75c; Grade 11.50c; special high grade 11.75c. T upward revision followed an advan in the United States market.

NONFERROUS METALS

(Cents per pound, carlots, except as otherwise noted)

Primary Metals

Copper: Electrolytic 17.62½-18.50c, Conn. Valley, Lake, 17.75c, Conn. Valley.

Brass Ingot: 85-5-5-5 (No. 115) 17.00-17.25c; 88-10-2 (No. 215) 25.25c; 80-10-10 (No. 305) 1.75c; No. 1 yellow (No. 405) 14.25-15.00c.

Zinc: Prime western 9.75c, brass special 0.00c, intermediate 10.00c, East St. Louis; high grade 10.75c, delivered.

Lead: Common 12.80c; chemical 12.90c; corroding 12.90c, St. Louis.

Primary Aluminum: 99% plus, ingots 17.00c, pigs 16.00c. Base prices for 10,000 lb and over, f.o.b. shipping point.

Secondary Aluminum: Piston alloys 16.50-17.00c; No. 12 foundry alloy (No. 2 grade) 15.75-16.50c; steel deoxidizing grades, notch bars, granulated or shot: Grade 1, 17.75-18.25c; grade 2, 16.75-17.25c; grade 3, 15.50-16.25c; grade 4, 14.75-15.75c. Prices include freight at carload rate up to 75 cents per 100 lb.

5% titanium-aluminum alloy No. 1 (low Cu) 21.00c; No. 2 (2% Cu) 28.00c, f.o.b. Eddystone, Pa.

Magnesium: Commercially pure (99.8%) standard ingots, 10,000 lb and over, 20.50c, f.o.b. Freeport, Tex.

Tin: Grade A tin, spot, 94.00c, New York; straits, November arrival, 93.00c, December arrival 92.00c. Chinese, 99% tin, prompt 86.50-87.00c; November arrival, 84.00-85.00c.

RFC selling prices for prompt delivery, ex-dock New York or f.o.b. Texas City, Tex.: Grade A, 99.8% or higher (including Straits) 95.00c; Grade B, 99.8% or higher, not meeting specs. for Grade A, with 0.05% max. arsenic, 94.80c; Grade C, 99.65-99.79%, incl., 94.40c; Grade D, 99.5-99.649%, 94.40c; Grade E, 99-99.499%, 94.00c; Grade F, 98-98.999%, 93.50c; Grade G, 95-97.999%, 91.00c. Prices for grade D through Grade G are for tin content.

Antimony: American 99-99.8% and over but not meeting specifications below, 32.00c; 99.8% and over (arsenic 0.05% max.; other impurities, 0.1% max.) 32.50c; f.o.b. Laredo, Tex., or bulk shipments. Foreign, 99% (Chinese, English, Belgium), prompt, 26.25c, New York.

Nickel: Electrolytic cathodes, 99.9%, base sizes at refinery, unpacked, 40.00c; 25-lb pigs, 52.50c; "XX" nickel shot, 43.50c; "F" nickel shot or ingots, for addition to cast iron, 50.50c. Prices include import duty.

Mercury: Open market, spot, New York $73-75 per 76-lb flask.

Beryllium-Copper: 3.75-4.25% Be, $24.50 per lb contained Be.

Cadmium: "Regular" straight or flat forms, $2 del.; special or patented shapes, $2.15.

Cobalt: 97-98%, $1.80 per lb for 550 lb (keg); $1.82 per lb for 100 lb (case); $1.87 per lb under 100 lb.

Gold: U. S. Treasury, $35 per ounce.

Silver: Open market, New York, 73.25c per oz.

Platinum: $69-72 per ounce.

Palladium: $24 per troy ounce.

Iridium: $100-$110 per troy ounce.

Titanium (sponge form): $5 per pound.

Rolled, Drawn, Extruded Products

COPPER AND BRASS

(Base prices, cents per pound, f.o.b. mill; based on 16-cent copper.)

Sheet: Copper 31.30; yellow brass 28.19; commercial bronze, 95%, 31.28; 90%, 30.84; red brass, 85%, 29.89; 80%, 29.47; best quality, 19.01; nickel silver, 18%, 41.78; phosphor-bronze, grade A, 5%, 50.47.

Rods: Copper, hot-rolled 27.15; cold-drawn 28.40; yellow brass free cutting, 22.76; commercial bronze, 95% 30.97; 90% 30.53; red brass 85% 29.58; 80% 29.16.

Seamless Tubing: Copper 31.34, yellow brass 31.20; commercial bronze 90% 33.50; red brass 85% 32.80; 80% 32.38.

Wire: Yellow brass 28.48; commercial bronze, 95% 31.57; 90% 31.13; red brass, 85% 30.18; 80% 29.76; best quality brass 29.30.

Copper Wire: Bare soft, f.o.b., eastern mills, 500,000 lb lots 22.42½, l.c.l. 23.05, c.l. 22.55; weatherproof, f.o.b. eastern mills, 100,000 lb lots 24.693, l.c.l. 25.443, c.l. 24.943; magnet, delivered, c.l. 27.62½, 15,000 lb or more 27.87½, l.c.l. 28.37½.

ALUMINUM

Sheets and Circles: 2s and 3s mill finish c.l.

Thickness Range, Inches	Widths or Diameters, Flat Sheet Base* In., Incl.	Coiled Sheet Base	Coiled Sheet Circle† Base
0.249-0.136	12-48	26.9	...	...
0.135-0.096	12-48	27.4	...	...
0.095-0.077	12-48	27.9	26.0	29.6
0.076-0.068	12-48	28.5	26.2	29.8
0.067-0.061	12-48	28.5	26.2	29.8
0.060-0.048	12-48	28.7	26.4	30.1
0.047-0.038	12-48	29.1	26.6	30.4
0.037-0.030	12-48	29.5	27.0	30.9
0.029-0.024	12-48	29.9	27.3	31.3
0.023-0.019	12-36	30.5	27.7	31.8
0.018-0.017	12-36	31.1	28.3	32.6
0.016-0.015	12-36	31.8	28.9	33.5
0.014	12-24	32.7	29.7	34.6
0.013-0.012	12-24	33.6	30.4	35.5
0.011	12-24	34.6	31.3	36.7
0.010-0.0095	12-24	35.6	32.3	38.0
0.009-0.0085	12-20	36.8	33.4	39.5
0.008-0.0075	12-20	38.1	34.6	41.1
0.007	12-18	39.5	35.9	42.9
0.006	12-18	41.0	37.2	47.0

* Minimum length, 60 inches. † Maximum diameter, 24 inches.

Screw Machine Stock: 5000 lb and over.

Diam. (in.) or distance across flats	—Round— R317-T4, 17S-T4	——Hexagonal—— R317-T4	17S-T4
0.125	48.0	...	...
0.156-0.203	41.0	...	...
0.219-0.313	38.0	...	...
0.344	37.0	...	47.0
0.375	36.5	45.5	44.0
0.406	36.5	...	...
0.438	36.5	45.5	44.0
0.469	36.5	...	...
0.500	36.5	45.5	44.0
0.531	36.5	...	...
0.563	36.5	...	41.5
0.594	36.5	...	...
0.625	36.5	43.0	41.5
0.656	36.5	...	...
0.688	36.5	...	41.5
0.750-1.000	35.5	40.5	39.0
1.063	35.5	...	37.5
1.125-1.500	34.5	39.0	37.5
1.563	34.5	...	37.5
1.625	33.5	...	36.5
1.688-2.000	33.5	...	...
2.125-2.500	32.5	...	...
2.625-3.375	31.5	...	...

LEAD

(Prices to jobbers, f.o.b. Buffalo, Cleveland, Pittsburgh) Sheets: Full rolls, 140 sq ft or more, $18.00 per cwt; add 50c per cwt, 10 sq ft to 140 sq ft. Pipe: Full coils, $18.00 per cwt. Traps and bends: List price plus 48%.

ZINC

Sheets, 15.50c f.o.b. mill, 36,000 lb and over Ribbon zinc in coils, 15.00c, f.o.b. mill, 36,000 lb and over. Plates, not over 12-in., 14.00c; over 12-in., 15.00c.

NICKEL

(Base prices f.o.b. mill)

Sheets, cold-rolled, 60.00c. Strip, cold-rolled 66.00c. Rods and shapes, 56.00c. Plates 58.00c. Seamless tubes, 89.00c.

MONEL

(Base prices, f.o.b. mill)

Sheets, cold-rolled 47.00c; Strip, cold-rolled, 50.00c. Rods and shapes, 45.00c. Plates, 46.00c. Seamless tubes, 80.00c. Shot and blocks, 40.00c.

MAGNESIUM

Extruded Rounds, 12 in. long, 1.312 in. in diameter, less than 25 lb, 52.00-56.00c; 25 to 99 lb, 42.00-46.00c; 100 lb to 4000 lb, 35.00-36.00c.

Plating Materials

Chromic Acid: 99.9% flake, f.o.b. Philadelphia, carloads, 25.50c; 5 tons and over 26.00c; 1 to 5 tons, 26.50c; less than 1 ton, 27.00c.

Copper Anodes: Base, 2000 to 5000 lb; f.o.b. shipping point, freight allowed; Flat untrimmed 27.96c; oval 27.46c; cast 25.99c.

Copper Cyanide: 70-71% Cu, 100-lb drums, 45.00c f.o.b. Niagara Falls, N. Y.

Sodium Cyanide: 96-98%, ½-oz ball, in 200 lb drums, 1 to 900 lb, 18.00c; 1000 to 19,000 lb, 17.00c, f.o.b. Niagara Falls, N. Y. Packaged in 100 lb drums add ½-cent.

Copper Carbonate: 54-56% metallic Cu; 50 lb bags, up to 250 lb, 25.25c; over 250 lb, 24.25c, f.o.b. Cleveland.

Nickel Anodes: Rolled oval, carbonized, carloads, 56.00c; 10,000 to 30,000 lb, 57.00c; 3000 to 10,000 lb, 58.00c; 500 to 3000 lb, 59.00c; 100 to 500 lb, 61.00c; under 10 lb, 64.00c; f.o.b. Cleveland.

Nickel Chloride: 100-lb kegs, 26.50c; 400-lb bbl, 24.50c, f.o.b. Cleveland, freight allowed on barrels, or 4 or more kegs.

Tin Anodes: Bar, 1000 lb and over, 111.00c, 500 to 999 lb, 111.50c; 200 to 499 lb. 112.00c; less than 2090 lb, 113.50c; ball, 1000 lb and over, 113.25c; 500 to 999 lb, 113.75c; 200 to 499 lb. 114.25c; less than 200 lb, 115.75c f.o.b. Sewaren, N. J.

Sodium Stannate: 25 lb cans only, less than 100 lb, to consumers 67.9c; 100 or 300 lb drums only, 100 to 500 lb, 59.7c; 600 to 1900 lb, 57.3c; 2000 to 9900 lb, 55.5c, f.o.b. Sewaren, N. J. On 100 or 350 lb drums only, 100 to 600 lb 59.7c; 600 to 1900 lb, 57.3c; 2000 to 9900 lb, 55.5c; 10,000 lb and over, 54.4c, f.o.b. Carteret, N. J. Freight not exceeding St. Louis rate allowed.

Zinc Cyanide: 100-lb drums 38.00c, f.o.b. Niagara Falls, N. Y.; 40.50c, f.o.b. Cleveland; 39.25c, del., Detroit and Philadelphia.

Stannous Sulphate: 100 lb kegs or 400 lb bbl, less than 2000 lb 96.00c; more than 2000 lb, 94.00c, f.o.b. Carteret, N. J.

Stannous Chloride (Anhydrous): In 400 lb bbl, 83.00c; 100 lb kegs 84.00c, f.o.b. Carteret, N. J.

Scrap Metals

BRASS MILL ALLOWANCES

Prices in cents per pound for less than 15,000 lb f.o.b. shipping point.

	Clean Heavy	Rod Ends	Clean Turnings
Copper	14.62½	14.62½	13.87½
Yellow brass	12.00	11.75	11.00
Commercial Bronze			
95%	13.62½	13.37½	12.87½
90%	13.50	13.25	12.75
Red brass			
85%	13.25	13.00	13.12½
80%	13.00	12.75	12.25
Best Quality (71-80%)	12.87½	12.62½	12.12½
Muntz Metal	11.12½	10.87½	10.37½
Nickel, silver, 10%	14.00	13.75	7.00
Phos. bronze, A	16.37½	16.12½	15.12½
Naval brass	11.62½	11.37½	10.87½
Manganese bronze	11.62½	11.37½	10.75

BRASS INGOT MAKERS BUYING PRICES

(Cents per pound, delivered refinery, carload lots)

No. 1 copper 14.50-14.75; No. 2 copper 13.50-13.75; light copper 12.50-12.75; composition red brass 12.50; radiators 9.50-9.75; heavy yellow brass 9.50.

REFINERS' BUYING PRICES

(Cents per pound, delivered refinery, carload lots)

No. 1 copper 14.50; No. 2 copper 13.50; light copper 12.50; refinery brass (60% copper) per dry copper content 12.00; radiators 9.00.

DEALERS' BUYING PRICES

(Cents per pound, New York, in ton lots)

Copper and Brass: Heavy copper and wire No. 1 13.00-13.25; No. 2 12.00-12.25; light copper 11.00-11.25; No. 1 composition red brass 10.75-11.00; No. 1 composition turnings 10.25-10.50; mixed brass turnings 6.50-6.75; new brass clippings 10.00-10.50; No. 1 brass rod turnings 8.75-9.00; light brass 6.25-6.50; heavy yellow brass 7.00-7.25; new brass rod ends 9.25-9.50; auto radiators, unsweated 8.50-8.75; cocks and faucets, 9.00-9.25; brass pipe 9.50-9.75.

Lead: Heavy 9.50-9.75, battery plates 5.00-5.25; linotype and stereotype 10.00-10.25; electrotype 9.00-9.25; mixed babbitt 9.75-10.00.

Zinc: Old zinc 4.00-4.25; new die cast scrap 3.75-4.00; old die cast scrap 2.75.

Tin: No. 1 pewter 48.00-50.00, block tin pipe 70.00-72.00, No. 1 babbitt 36.00-38.00.

Aluminum: Clippings 2S 10.00-10.50, old sheets 7.50-8.00, crankcase 7.50-8.00, borings and turnings 3.00-3.50.

DAILY PRICE RECORD

1949	Copper	Lead	Zinc	Tin	Aluminum	Antimony	Nickel	Silver
Nov. 3	17.625-18.50	12.80	9.75	94.00	17.00	32.00	40.00	73.25
Nov. 1-2	17.625	12.80	9.75	94.00	17.00	32.00	40.00	73.25
Oct. Avg.	17.625	13.242	9.317	95.505	17.00	32.00	40.00	73.25
Oct. 28-31	17.625	12.80	9.50	94.00	17.00	32.00	40.00	73.25
Oct. 27	17.625	12.80	9.50	94.50	17.00	32.00	40.00	73.25
Oct. 24-26	17.625	12.80	9.25	95.00	17.00	32.00	40.00	73.25
Oct. 18-22	17.625	12.80	9.25	95.750	17.00	32.00	40.00	73.25
Oct. 17	17.625	12.80	9.25	95.875	17.00	32.00	40.00	73.25
Oct. 14-15	17.625	12.85	9.25	95.875	17.00	32.00	40.00	73.25
Oct. 10-13	17.625	13.55	9.25	95.875	17.00	32.00	40.00	73.25

NOTE: Copper: Electrolytic, del. Conn. Valley; Lead, common grade, del. E. St. Louis; Zinc, prime western, del. St. Louis; Tin, Straits, del, New York; Aluminum, primary ingots, 99%, del.; Antimony, bulk, f.o.b. Laredo, Tex.; Nickel, electrolytic cathodes, 99.9%, base sizes at refinery unpacked; Silver, open market, New York. Prices, cents per pound; except silver, cents per ounce.

IRON AND STEEL SCRAP

Consumer prices, except as otherwise noted, including brokers' commissions, as reported to STEEL, Oct. 27, 1949; gross tons except as noted. Changes shown in italics.

STEELMAKING SCRAP COMPOSITE

Nov. 3	$28.00
Oct. 27	26.67
Oct. 1949	26.71
Nov. 1948	43.25
Nov. 1944	16.50

Based on No. 1 heavy melting grade at Pittsburgh, Chicago and eastern Pennsylvania.

PITTSBURGH

No. 1 Heavy Melt.	*$29.00-30.00*
No. 2 Heavy Melt.	*27.00-28.00*
No. 1 Busheling	*29.00-30.00*
No. 1 Bundles	*29.00-30.00*
No. 2 Bundles	*24.00-25.00*
No. 3 Bundles	*23.00-24.00*
Heavy Turnings	*23.50-24.50*
Machine Shop Turnings	*21.50-22.00†*
Mixed Borings, Turnings	*21.50-22.00†*
Short Shovel Turnings	*23.00-24.00*
Cast Iron Borings	*22.00**
Low Phos. Steel	*31.50-32.50*

Cast Iron Grades*

No. 1 Cupola Cast	35.00-36.00
No. 1 Machinery Cast	39.00-40.00
Charging Box Cast	31.00-32.00
Heavy Breakable Cast	28.00-29.00

Railroad Scrap*

No. 1 R.R. Heavy Melt.	31.00
Axles	35.00-36.00
Rails, Random Length	34.00-35.00
Rails, 2 ft and under	38.00-39.00
Rails, 18 in. and under	39.00-40.00
Railroad Specialties	32.00-33.00
Angles, Splice Bars	32.00-33.00

* Nominal.
† Crushers' buying prices.

CLEVELAND

No. 1 Heavy Melt. Steel	*$26.50†*
No. 2 Heavy Melt. Steel	*25.50†*
No. 1 Busheling	*26.50†*
No. 1 Bundles	*26.50†*
No. 2 Bundles	*23.50†*
Machine Shop Turnings	*18.00†*
Mixed Borings, Turnings	*20.00†*
Short Shovel Turnings	*20.00†*
Cast Iron Borings	*20.00†*
Bar Crops and Plate	*28.50†*
Punchings & Plate Scrap	*28.50†*
Cut Structurals	*31.50†*

† Nominal.

Cast Iron Grades†

No. 1 Cupola	*43.00-44.00*
Charging Box Cast	*36.00-37.00*
Stove Plate	*37.00-38.00*
Heavy Breakable Cast	*34.00-35.00*
Unstripped Motor Blocks	*31.50-32.50*
Brake Shoes	*31.00-32.00*
Clean Auto Cast	*45.00-46.00*
No. 1 Wheels	*37.00-38.00*
Burnt Cast	*32.00-33.00*

† Nominal.

Railroad Scrap

No. 1 R.R. Heavy Melt.	32.00-33.00
R.R. Malleable	*37.50-38.50*
Rails, 3 ft and under	*41.00-42.00*
Rails, Random Lengths	*37.00-38.00*
Cast Steel	*34.00-35.00*
Railroad Specialties	*34.00-35.00*
Uncut Tires	*34.00-35.00*
Angles, Splice Bars	*40.00-41.00*

VALLEY

No. 1 Heavy Melt. Steel	29.00-29.50
No. 2 Heavy Melt. Steel	28.00-28.50
No. 1 Bundles	29.00-29.50
No. 2 Bundles	25.00-25.50
Machine Shop Turnings	19.00-20.00
Short Shovel Turnings	22.00-23.00
Cast Iron Borings	22.00-23.00
Low Phos.	*31.00-31.50*

Railroad Scrap

No. 1 R.R. Heavy Melt.	*32.50-33.50*

PHILADELPHIA

No. 1 Heavy Melt. Steel	*$25.00*
No. 2 Heavy Melt. Steel	*23.00*
No. 1 Busheling	*23.00*
No. 1 Bundles	*25.00*
No. 2 Bundles	*22.00*
Machine Shop Turnings	17.00
Short Shovel Turnings	18.00
Mixed Borings, Turnings	*16.00*
Bar Crop and Plate	26.00-27.00
Punchings & Plate Scrap	26.00-27.00
Cut Structurals	*25.00-26.00*
Elec. Furnace Bundles	*25.00*
Heavy Turnings	*25.00*
No. 1 Chemical Borings	26.00-27.00

Cast Iron Grades

No. 1 Cupola Cast	*35.00*
No. 1 Machinery Cast	*38.00-39.00*
Charging Box Cast	*35.00*
Heavy Breakable Cast	*35.00*
Unstripped Motor Blocks	*30.00*
Clean Auto Cast	*38.00-39.00*
No. 1 Wheels	*38.00*
Malleable	*37.00*

CINCINNATI

No. 1 Heavy Melt. Steel	*$27.00*
No. 2 Heavy Melt. Steel	*24.00*
No. 1 Busheling	*27.00*
No. 1 Bundles	*27.00*
No. 2 Bundles	*22.00*
Machine Shop Turnings	*14.00*
Short Shovel Turnings	*17.00*
Mixed Borings, Turnings	15.00
Cast Iron Borings	*17.00*

Cast Iron Grades

No. 1 Cupola Cast	41.00
Charging Box Cast	31.00
Heavy Breakable Cast	34.00
Stove Plate	30.00
Unstripped Motor Blocks	20.00
Brake Shoes	22.00
Clean Auto Cast	*41.00*
Drop Broken Cast	45.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	*29.00*
R.R. Malleable	33.00
Rails, Rerolling	*38.00*
Rails, Random Lengths	35.00
Rails, 18 in. and under	44.00

DETROIT

(Brokers' buying prices, f.o.b. shipping point)

No. 2 Heavy Melt. Steel	*$19.00-20.00*
No. 1 Bundles	*22.00-23.00*
No. 2 Bundles	*18.00-19.00*
No. 1 Busheling	*22.00-23.00*
Machine Shop Turnings	*14.00-15.00*
Mixed Borings, Turnings	*14.00-15.00*
Short Shovel Turnings	*16.00-17.00*
Cast Iron Borings	*16.00-17.00*
Punchings & Plate Scrap	*22.00-23.00*

Cast Iron Grades

No. 1 Cupola Cast	*33.00-34.00*
Heavy Breakable Cast	*29.00-30.00*
Clean Auto Cast	*33.00-34.00*

BUFFALO

No. 1 Heavy Melt. Steel	$27.00-27.50
No. 2 Heavy Melt. Steel	24.50-25.00
No. 1 Bushelings	24.50-25.00
No. 1 Bundles	25.50-26.00
No. 2 Bundles	23.00-23.50
Machine Shop Turnings	18.00-18.50
Mixed Borings, Turnings	19.00-19.50
Cast Iron Borings	19.00-19.50
Short Shovelings	20.50-21.00
Low Phos.	28.50-29.00

Cast Iron Grades

No. 1 Machinery	*37.50-38.00*
No. 1 Cupola	*36.50-37.00*
Mixed Yard	35.50-36.00
Malleable	34.50-35.00

Railroad Scrap

Rails, 3 ft. and under	35.00-36.00
Scrap rails	30.00-31.00
Specialties	31.00-32.00
No. 1 car wheels	32.00-33.00

NEW YORK

(Brokers' buying prices f.o.b. shipping point)

No. 1 Heavy Melt. Steel	*$20.00*
No. 2 Heavy Melt. Steel	*18.00*
No. 1 Busheling	*16.00*
No. 1 Bundles	*20.00*
No. 2 Bundles	*16.00*
No. 3 Bundles	nominal
Machine Shop Turnings	10.00-11.00
Mixed Borings, Turnings	10.00-11.00
Short Shovel Turnings	11.00-12.00
Punchings & Plate Scrap	22.00-23.00
Cut Structurals	22.00-23.00
Elec. Furnace Bundles	*20.00-21.00*

Cast Iron Grades

No. 1 Cupola Cast	29.00-30.00
No. 1 Machinery	31.00-32.00
Charging Box Cast	25.00-26.00
Heavy Breakable	25.00-26.00
Unstripped Motor Blocks	26.00
Malleable	*35.00*

BOSTON

(F.o.b. shipping point)

No. 1 Heavy Melt. Steel	*$18.00-19.00*
No. 2 Heavy Melt. Steel	*16.50-17.00*
No. 1 Bundles	*18.00-19.00*
No. 1 Busheling	*14.50-15.00*
Machine Shop Turnings	*10.50-11.50*
Mixed Borings, Turnings	*10.00-10.50*
Short Shovel Turnings	*12.00-13.00*
Bar Crops and Plate	*20.00-21.00*
Punchings & Plate Scrap	*20.00-21.00*
Chemical Borings	*17.00-19.00*

Cast Iron Grade

No. 1 Cupola Cast	30.00-31.00
Mixed Cast	27.00-28.00
Heavy Breakable Cast	28.00-29.00
Stove Plate	*24.00-25.00*
Unstripped Motor Blocks	20.00-21.00

CHICAGO

No. 1 Heavy Melt. Steel	*$29.00-30.00**
No. 2 Heavy Melt. Steel	*28.00-29.00**
No. 1 Bundles	*29.00-30.00**
No. 2 Bundles	*26.00-27.00**
No. 3 Bundles	*18.00-19.00**
Machine Shop Turnings	*21.00-22.00*
Mixed Borings, Turnings	*21.00-22.00*
Short Shovel Turnings	*22.00-23.00**
Cast Iron Borings	*20.00-21.00**
Bar Crops and Plate	29.00-31.00
Punchings	29.00-31.00
Elec. Furnace Bundles	*29.00-30.00**
Heavy Turnings	*24.00-25.00**
Cut Structurals	*30.00-31.00**

Cast Iron Grades

No. 1 Cupola Cast	41.00-42.00
Clean Auto Cast	41.00-42.00
No. 1 Wheels	33.00-34.00
Stove Plate	33.00-34.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	*33.00-34.00*
Malleable	37.00-38.00
Rails, Rerolling	*44.00-45.00*
Rails, Random Lengths	*42.00-44.00**
Rails, 2 ft. and under	*42.00-43.00**
Rails, 18 in. and under	*43.00-44.00**
Railroad Specialties	*35.00-36.00**
Angles, Splice Bars	*36.00-37.00**

* Nominal.

ST. LOUIS

No. 1 Heavy Melt. Steel	*$30.00-31.00*
No. 2 Heavy Melt. Steel	25.00-26.00
Machine Shop Turnings	*19.00-20.00*
Short Shovel Turnings	21.00-22.00

Cast Iron Grades

No. 1 Cupola Cast	*37.00-38.00*
Charging Box Cast	34.00-35.00
Heavy Breakable Cast	32.00-33.00
Brake Shoes	32.00-33.00
Clean Auto Cast	40.00-42.00
Burnt Cast	32.00-33.00

Railroad Scrap

R.R. Malleable	31.00-32.00
Rails, Rerolling	39.00-40.00
Rails, Random Lengths	*35.00-36.00*
Rails, 3 ft. and under	*37.00-39.00*
Uncut Tires	*29.00-30.00*
Angles, Splice Bars	*37.00-38.00*
Railroad Specialties	*30.00-31.00*

BIRMINGHAM

No. 1 Heavy Melt. Steel	$25.00
No. 2 Heavy Melt. Steel	24.50
No. 1 Busheling	2
No. 2 Bundles	2
Machine Shop Turnings	1
Mixed Borings, Turnings	1
Short Shovel Turnings	1
Cast Iron Borings	1
Bar Crops and Plate	3
Cut Structurals	2

Cast Iron Grades

No. 1 Cupola Cast	34.00-3
Stove Plate	28.00-3
No. 1 Wheels	23.00-2

Railroad Scrap

No. 1 R.R. Heavy Melt.	2
R. R. Malleable	nom
Rails, Rerolling	3
Rails 3 ft. and under	25.00-2
Angles and Splice Bars	31.00-3

SAN FRANCISCO

No. 1 Heavy Melt. Steel	$1
No. 2 Heavy Melt. Steel	1
Nos. 1 & 2 Bundles	1

Cast Iron Grades

No. 1 Cupola Cast	23.00-2

Railroad Scrap

No. 1 R.R. Heavy Melt.	1
Wheels	1
Rails, Random Lengths	1

SEATTLE

No. 1 Heavy Melt. Steel	$1
No. 2 Heavy Melt. Steel	1
No. 1 Busheling	1
Nos. 1 & 2 Bundles	1
No. 3 Bundles	n
Machine Shop Turnings	1
Mixed Borings, Turnings	1
Punchings & Plate Scrap	2
Cut Structurals	2
Elec. Furnace Bundles	2

Cast Iron Grades

No. 1 Cupola Cast	25.00-2
Heavy Breakable Cast	1
Stove Plate	1
Unstripped Motor Blocks	1
Malleable	2
Brake Shoes	17.00-1
Clean Auto Cast	2
No. 1 Wheels	2

Railroad Scrap

No. 1 R.R. Heavy Melt.	1
Railroad Malleable	2
Rails, Random Lengths	1
Angles and Splice Bars	1

LOS ANGELES

(F.o.b. car, Los Angeles)

No. 1 Heavy Melt. Steel	$2
No. 2 Heavy Melt. Steel	1
Nos. 1 & 2 Bundles	1
No. 3 Bundles	n
Machine Shop Turnings	1
Mixed Borings, Turnings	1
Punchings & Plate Scrap	2
Electric Furnace Bundles	2

Cast Iron Grades

No. 1 Cupola Cast	$3

Railroad Scrap

No. 1 R.R. Heavy Melt.	2
Rails, Rerolling	2

HAMILTON, ONT.

(Delivered prices)

Heavy Melt.	$2
No. 1 Bundles	2
Mechanical Bundles	2
Mixed Steel Scrap	2
Mixed Borings, Turnings	1
Rails, Remelting	2
Rails, Rerolling	2
Busheling	1
Bushelings new factory, prep'd	2
Bushelings new factory, unprep'd	1
Short Steel Turnings	1

Cast Iron Grades*

Cast	40.00-4

* Removed from price con Aug. 9, 1947; quoted on basis f.o.b. shipping point.

Sheets Strip . . .

Sheet and Strip Prices, Page 185 & 186 & 187

Cleveland—Even if flat-rolled steel production is back to pre-strike levels by end of November, mills will be unable to deliver all tonnage booked until well into first quarter of next year. Accumulations are heaviest in months and the carryover into first quarter will be substantial, especially in the more popular gages. Some of the tonnage now held may wash out when the strike ends and the outlook becomes clearer, but this is not likely to materially lessen the threat of tight supplies. Pinch of short and unbalanced inventories is reflected in an increasing number of manufacturing curtailments. Some shops that have been forced to curtail or close will not be able to fully replenish inventories until well into next quarter. Anticipating return of tight supply conditions, with gray market operations again figuring prominently, the Pressed Metal Institute has revived its trading exchange, enabling members to obtain fill-in tonnage from among themselves. Offers of surplus stocks are beginning to appear in the market in increasing number.

Boston—Mills' order backlogs for sheets, notably cold-rolled, have increased. Once the log jam of unscheduled tonnage is cleared, books will be filled through first quarter and beyond. Considerable buying is of protective nature, but few cancellations or deferments are expected. Consumers' cold-rolled strip supply is not so critical because a substantial ratio of tonnage normally produced in this area was not halted. Cold-rolled strip mills have been forced to adjust rollings to inventories of hot-rolled.

New York—With many mills still down, the delivery situation on sheets continues uncertain. Most mills are accepting orders for hot-rolled sheets on the basis of 12 to 15 weeks from the time of resumption of operations. Still longer promises are being made on cold-rolled and galvanized.

Philadelphia—Strong demand for sheets is expected. Even before the steel strike most consumer stocks were not sufficient for current needs, a situation that has been further complicated by the shutdown of many mills. As mill operations resume, there should be increasing pressure for all major grades. Some mills are booking tonnage tentatively well into the second quarter, although one producer who has been able to keep most of his units going has not opened books for the next period. Hence, this producer is out of the market on all grades except stainless and certain specialties.

Pittsburgh — Effort to conserve sheet and strip inventories has resulted in curtailment among a growing number of metalworking companies. Some interests state hold-up of delivery instructions on finished products is an additional factor necessitating lower schedules. Most metalworking concerns estimate it will be 3 to 4 weeks after steel suppliers resume operations before orders on mill books will be shipped. Unbalanced stock of important components is major threat to produc-

SLASH MELTING COSTS

JOHNSON
No. 1019
SOFT METAL FURNACE

$312.00
F. O. B. FACTORY

for heavy-duty melting • Save time and gas in melting large quantities of lead, tin, zinc, pot metal, type metal, aluminum, etc. Nine powerful Johnson direct jet burners deliver pot temperatures up to 1400° F. for fast melting. Assures quick recovery after reloading. Each burner has separate shut-off valve and pilot light permitting use of only as many burners as needed to maintain melting temperature. Heavily insulated to reduce heat loss. Complete with removable cast iron pot and lifting hooks.

SPECIFICATIONS
Height—30", Diameter—30".
Capacity—1000 lbs. lead.
Pot—19" diam. x 10" deep.
B.T.U. Input—234,000 per hour.
Shipping Weight—600 lbs.

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JOHNSON No. 120
HEAT TREATING FURNACE

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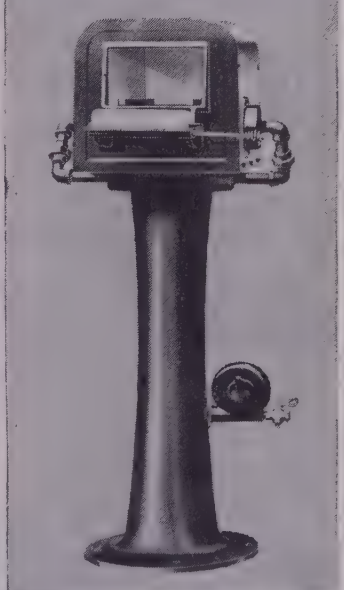
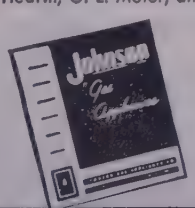
• 2300° F. in 30 minutes

Quick Acting JOHNSON No. 120 is unexcelled for heat treating high speed steels, for hardening any steel tools, dies, or small metal parts. Ideal for brazing carbide tipped tools. Gets the job done *quick* to save time and gas. Easily regulated with accuracy. Firebox 5 x 7¾ x 13½ lined with high temperature insulating refractory. Complete with Carbofrax Hearth, G. E. Motor, and Johnson Blower.





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tion schedules. A cutback in production by Westinghouse is expected soon if strike is not terminated.

Anticipated shortage of plain and galvanized sheets through first quarter next year has prompted three of the former company members of the Phoenix-Apollo Co. to resume output of these items under the name of Whitney-Apollo Corp., Apollo, Pa.

Cincinnati—Ordering of sheets for first quarter is similar in tonnage and specifications to those earlier in the year. This indicates fabricators are depending on usual sources for first quarter tonnage and that they expect backed-up requirements to offset whatever decline in general business may have been generated by strikes. Pressure for current deliveries is extremely heavy. Strikes and the government bin program put a double squeeze on galvanized.

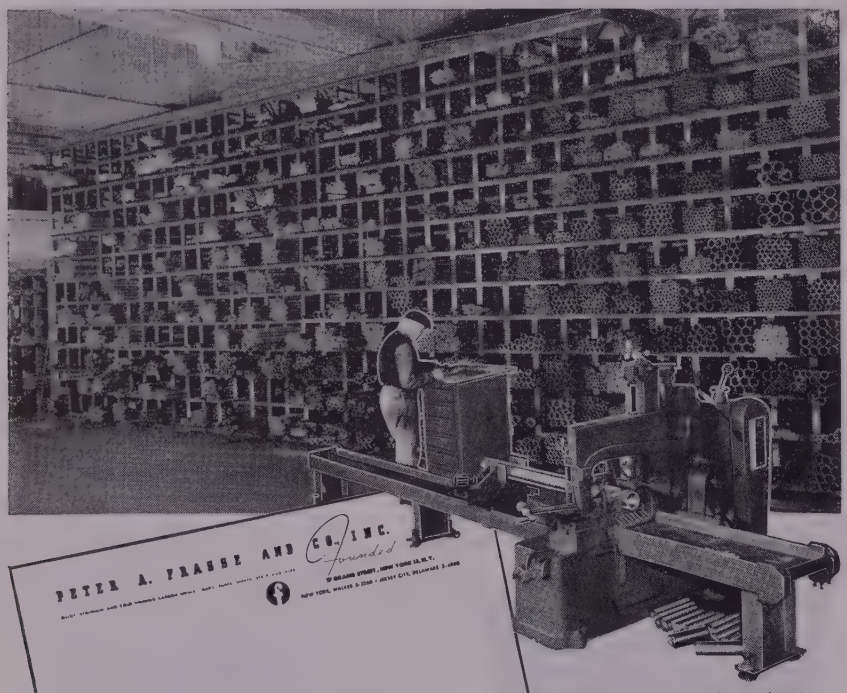
Chicago—Curtailments in certain sheet-fabricating departments are more commonplace. Complete closings are rare. Wherever possible, trades between plants and companies are negotiated and substitute materials used. New orders for cold-rolled and galvanized sheets probably can not be delivered before second quarter. Best strip promises are for about February shipment. New conversion agreements are concentrated in cold-rolled sheets but also spill over into other products. Most such deals involve auto makers.

Milwaukee—Big users of galvanized sheets probably are suffering the greatest loss from the strike. number of users of other types sheets have shortened the work-we one day or have furloughed about per cent of the work force. Ti table of curtailment at one importa plant here reduces operations to l than 50 per cent at the end of t month, and to 10 per cent in Dece ber. Lag in steel shipments aft the strike will force at least part adherence to this schedule.

St. Louis — Sheet demand h holds at a high level, with Octob showing twice the normal numb of new orders booked. First-quart books are filled and second quart orders are being refused. In rece weeks Granite City Steel Co. h been flooded with calls from strik bound steel centers. Its cold redu tion mill is operating at capacity. tin mill will be shut down 90 da starting Jan. 15 for improvemer which will end its production of h dipped tinplate and raise electroly output 50 per cent.

Los Angeles—Sheet consumers a relieved over the first signs of break in the steel deadlock. With b ginning of November, supplies b came a matter of weeks or days f most fabricators. One user had complete shutdown scheduled f mid-month. On resuming operatio producers will be allocating flat-roll items. Mills probably will not acce new orders for sheet for some tin

San Francisco—Sheet supplies the hands of consumers vary widel Jobbers' stocks of flat-rolled produc are dwindling slowly. Indications a that sheet supplies by mid-Novemb will be very tight.



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MARVEL SAWS
Better Machines - Better Blades

Tubular Goods . . .

Tubular Goods Prices, Page 188

Boston — Allocation of mercha steel pipe to distributors likely w continue well into first quarter some producers. Distributors' stoc are depleted and unbalanced with o ders for replacement substanti Lack of pipe has delayed some ou side work scheduled for completi before freezing. Utilities are es mating lateral line tonnage requi ments for natural gas distribution New England. Cast pipe orders a heavy for this season, an addition 4100 tons having been placed.

Pittsburgh—Replenishment of jo bers' stocks of standard pipe ite should sustain mill production sche ules at near capacity for at least months following end of the stri A similar situation is expected f oil country goods and to lesser e tent for specialty tubing items. So pipeline expansion programs ha been postponed because of the stri

Chicago—Shortages in many siz of tube rounds have caused a distri producer to close its hot mill. A suming semi-finished will be free available in a week to 10 days, th interest may not have to curtail fi ishing operations. The first part October saw ordering moderately i proved, but bookings slid off t latter part of the month.

Los Angeles—Pipe demand remai strong, although the petroleum i dustry is placing more emphasis new facilities for sales and distrib tion, less on exploitation or refinin

emand for 2 and 4-inch pipe has delined in the past 30 days.

San Francisco—Supply of casing nd steel tubing to cover needs of oil ompanies is tight. Pipeline builders re facing a shutdown on many projcts soon, because of the limited suply of large diameter pipe.

Seattle—Cast iron pipe demand is low, due to seasonal conditions and ell stocked position of large buyers. gencies are now in position to make rompt deliveries. Some small orders re moving out of stock.

tructural Shapes . . .

Structural Shape Prices, Page 185

Pittsburgh—Structural fabricators ot strike-bound have been able to aintain fairly satisfactory operaions. New jobs taken on have been estricted chiefly to those requiring tandard specifications. There is good rospect fabricating activity soon will ave to be curtailed should the strike ontinue. Wide flange beams are in hortest supply. A number of large cale industrial expansion programs ave been held up because of the trike and this situation likely will ecome more pronounced before mills gain resume normal operations.

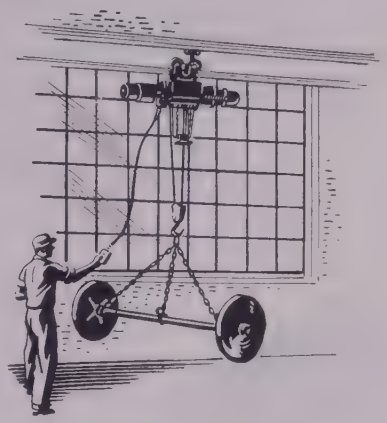
Boston—State bridges, Attleboro nd Leominster, Mass., account for 000 tons while the Sullivan Square, oston, project to be out shortly under two contracts takes 2250 tons. ulk of work being estimated is for ridges with scattering contracts for 00 tons or less going to district tructural shops; latter will not be eriously effected by lack of plain aterial with resumption of shipents on standard shapes likely to tart late this month or early Deember against new orders. Deliveres on wide flanged beams will be omewhat more extended.

New York—Structural demand is ess active and is dominated primarily y public work, including various ridge jobs and several schools. The argest individual school job is the lew York University law center, Vashington Square, requiring an esmated 1500 tons. This project is eing revived after several months, ith a revision in original plans.

Philadelphia — Structural business particularly slack at the moment. fair volume of inquiries, chiefly ublic inquiry, is noted but awards ave been negeligible. Resumption of perations by the leading eastern roducer holds promise of fairly arly relief in the supply of shapes. ome tonnage is expected to be movg shortly, although on new orders appears doubtful if much can be one under six weeks. Practically all abricators have been able to mainain operations since the beginning f the steel strike and, in a number f instances, they should now be ble to continue on without too much ifficulty. They admit it will be ouch and go on certain sizes, but elieve they can shift their work sufficiently to support current operaons.

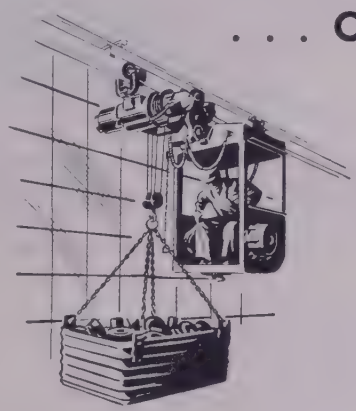
Los Angeles—With Kaiser Steel orp., Pacific States Steel Corp., and mall fabricating shops active, structral supplies are ample. Spot shortges are quickly erased. Numerous mall projects and several large ones

THEY LIFT THE SAME LOAD
BUT THEIR RUNNING COSTS DIFFER—



On the floor control, with the operator primarily occupied with other duties.

. . . OR



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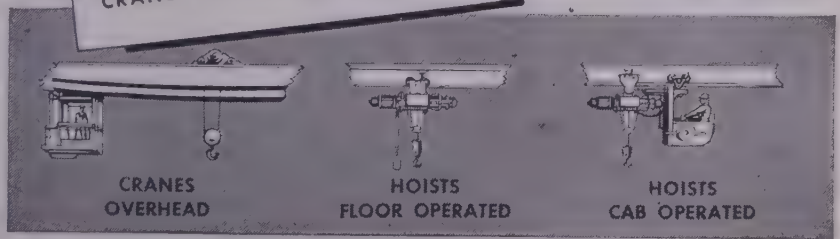

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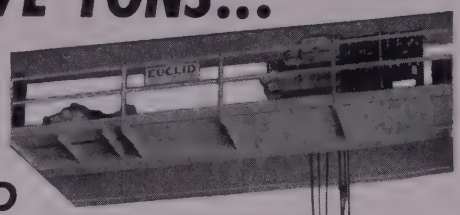

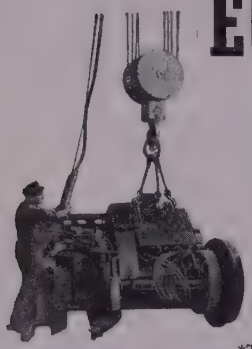

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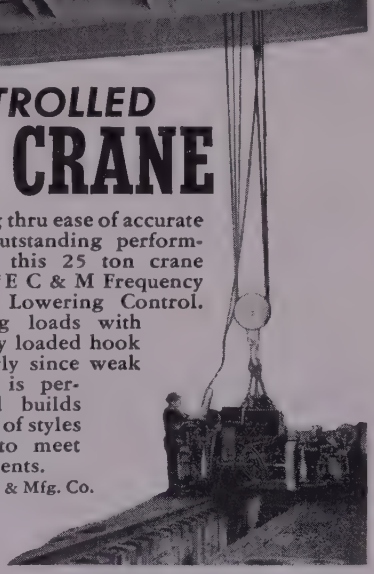

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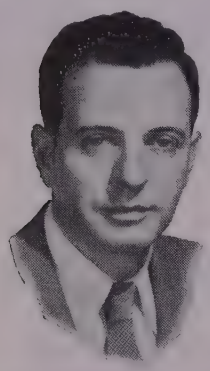

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Richard E. Waite, Field Representative
H-VW-M Rochester Office

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are under way.

Seattle-Pacific Car & Foundry Co Seattle, has resumed fabricating afte a fire with practically no delay i deliveries. Some small jobs under 10 tons each are pending and consider able major tonnages are involved i proposed government projects in th Pacific Northwest, including the Har ford plant military installations i Alaska. The largest fabricators re port about a 60 day materials back log.

San Francisco — Inventories o structurals remain fairly good. In dustrial and commercial building her is estimated 10 to 15 per cent unde last year at this time. Some deferre projects are being reconsidered.

Reinforcing Bars . . .

Reinforcing Bar Prices, Page 185

Seattle—Rolling mill production ha been reduced by a 10-day shutdow of Northwest Steel Rolling Mills' elec tric furnaces for repairs. The mill i rolling part time, as ingots are avail able. Inquiry for small tonnages o reinforcing bars is fair, but seasona conditions have decreased buying in terest. Demand for merchant bars i fair.

Steel Bars . . .

Bar Prices, Page 185

Philadelphia—With few exception hot carbon bar mills are promisin delivery against new orders withi six to eight weeks from time of re sumption, and even better on th heavier sizes. Certain producers hav committed themselves well into th first quarter. Cold drawers, wh have been forced down, are expecte to do better on most sizes, sinc their inventories were in fairly goo shape at the time employees walke out. Those who have been able t operate have had to carry a heav load but, with the exception of wir and some products requiring specia grinding, they are in position t make deliveries within possibly thre to four weeks. Shipments on som specifications will become worse be fore they improve because they wi be unable to make sufficient re placements of hot material in time

Boston—Carbon bar mill backlog are heavier as strikes have smoke out some protective buying. Wit resumption of rolling, shipments o hot-rolled are likely in about si weeks on smaller and medium size while cold-finished bar deliveries wi start in less time. Latter mills hav fairly substantial stocks. Booking of alloys have been limited.

Cleveland — Steel bar demand i stronger than it was pre-strike. Or der accumulations in hot-rolled car bon and alloy, as well as cold-finishe bars, are substantial. Producers ca hardly be expected to get back t n o r m a l production and shippin schedules in much under four week after the strike. Consequently, som tonnage scheduled for November December shipment will back int January, possibly beyond. Cold-fin ished bar inventories have bee shaved, though some consumers an warehouses are holding substantia stocks. The cold-finishers generall

accepting new business for delivery six to eight weeks after the mills resume production, but are guaranteeing delivery dates. Acdemand well into first half of 50 is anticipated.

Semifinished Steel . . .

Semifinished Prices, Page 185

Detroit—"Conversion" steel is coming back into the picture as automotive companies exhaust their inventories of finished steel and prospects fade for additional tonnage from established mill sources inside three to five weeks. Chrysler has made arrangements to buy 20,000 tons of electric furnace ingots for conversion into sheet and strip. Rotary Electric Steel Co., here, in the past has supplied large tonnages of conversion ingots.

Cleveland—Anticipating tight steel supply conditions over the next four to six months, especially in flat-rolled products, consumers are displaying renewed interest in conversion ingot. Last week automotive interests were dabbling at the conversion market and it was reported at least one tonnage was placed. Ford Motor was among those reported considering conversion tonnage.

Wire . . .

Wire Prices, Page 187

Boston—Shipping deferments are appearing for high carbon tonnage from the automobile industry. Bookings of wire mills operating are heavy while those down take substantial orders without definite delivery promises. Rescheduling will be widespread. Lack of other types of steel is affecting orders for some fasteners which carries back to wire mills.

New York—Drastic rescheduling, with orders on books at time of suspensions set back four to five weeks, confronts wire mills as production is resumed. Bookings during October were heavy, and, some producers are well booked through first quarter on many wire products and rods. Nails extend into second quarter.

Chicago—Forward ordering in wire products reaches into next quarter. Merchant product sales have accelerated at retail level, making likely a return to quotas. Nails are tightest of merchant wire line, some builders being completely out of specific sizes. Field stocks of posts and fencing are estimated over 30 days.

Plates . . .

Plate Prices, Page 185

Boston—Resumption of plate shipments will vary with individual mills, but some will be delivering tonnage before the month ends; backlogs on mills when strikes halted output were not heavy. Orders are heavier but, despite declining inventories, buying has not been too brisk during mill suspensions. Paradoxically, carbon plate tonnages have been offered from surplus stocks near mill prices. Maryland Drydock Co., Baltimore, has the contract for hull and superstructure for a small steamer, placed by New Bedford, Martha's Vineyard & Nantucket Steamship Authority.

New York—Eastern plate mill production has been given a substantial boost by resumption of operations by Bethlehem Steel Co. A further boost may come in the near future, as labor negotiations have been resumed at the plants of the Lukens Steel Co., Coatesville, Pa., and Worth Steel Co., Claymont, Del., the only two other plate makers in the east not already in operation. Meanwhile, demand remains slack, with mills in operation promising deliveries before year end.

Philadelphia—Most plate producers who have been forced down by strike can offer delivery against new orders within three weeks. The two producers in this district, who have not been forced down, are able to accept December tonnage. This reflects a continued lag in plate demand, due to absence of interest by some of the leading consumer groups, such as railroads, shipyards, and oil and gas equipment manufacturers. Demand for fuel oil tanks, which has been the mainstay of the market over recent weeks, is now easier.

Los Angeles—Plate supplies are pretty well depleted in several categories. Kaiser's Fontana mill expects to allocate through December, possibly January. There are indications of increased requirements for light gage plate by tank fabricators and jobbers.

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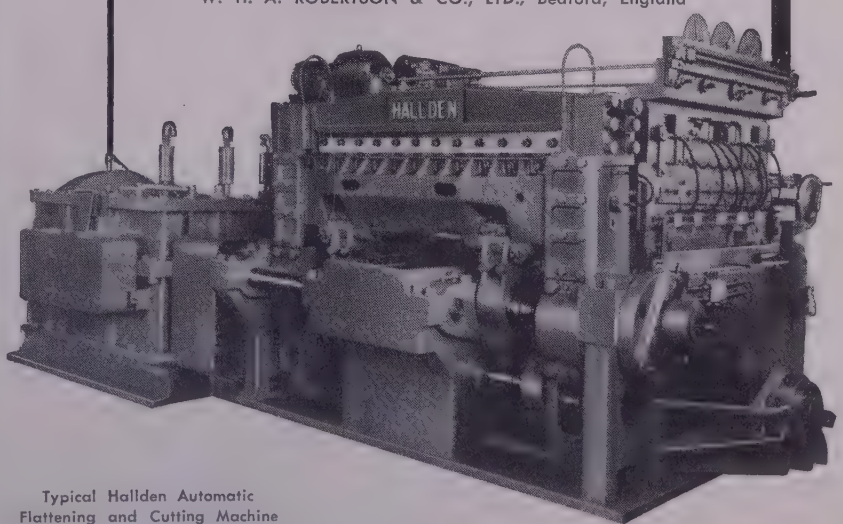

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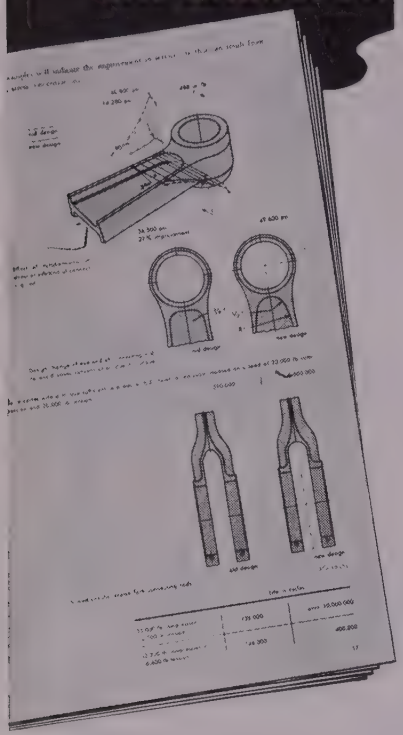

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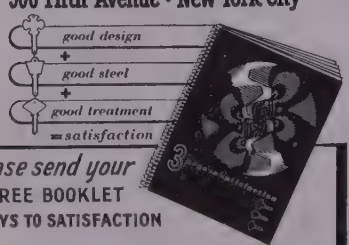

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Pig Iron . . .

Pig Iron Prices, Page 184

Boston—Although source of basic iron has been closed more than a month, consumers will manage to maintain operations, although one steelworks will be nearly out before new tonnage arrives. Changes in open-hearth practice at one works means heavier use of cupola hot metal and lower pig iron reserve; this plant has produced steel at 100 per cent capacity throughout the strike. Foundry melt holds to improved volume started in late summer, but has leveled off. Bulk of Mystic production last month went to consumers and less iron is going into stockpile.

New York—Bethlehem Steel Co. was able to resume operations by late last week of all furnaces forced down by the strike. Foundry melt is being maintained at a steady level, with most consumers in fairly comfortable position with regard to supply.

Buffalo—Pressure for delivery of merchant iron is not urgent. Manufacturers are placing smaller orders for castings and, as a result, foundries' iron inventories are ample to cover present requirements. The coke shortage continues as a serious threat to production.

Philadelphia — With Bethlehem Steel Co. having reached an agreement with CIO, blast furnace production in this district is due for a sharp spurt. Its furnaces generally were banked and, consequently, production of iron will be resumed much faster than otherwise. Much of this iron will go to meet the company's own needs for the present.

Pittsburgh—Captive steel mill equipment foundries and those serving the enamelware and radiation industry are active while jobbing concerns and those supplying castings to the railroad, farm implement, ingot mold and other industries are operating at a low rate. Coke supply is chief production bottleneck among those interests still operating near capacity. Merchant pig iron output has not been significantly curtailed during strike period to date.

Cleveland—Foundries are comfortably supplied with iron and no serious shortage has threatened throughout the period of the strike, because most merchant producers continued to operate. A few "hold" orders have been received by the foundries from customers preparing to curtail operations because of unbalanced steel and component inventories. Promptness with which these orders are reactivated depends upon the speed with which steel begins moving into consumption once the steel strike ends. Steelworks blast furnaces will get back into production quickly at strike's end since the stacks have been banked, not blown out.

Cincinnati—Foundry melt is being sustained fairly well in this district, but increasingly urgent calls for coke indicate curtailments are near at hand. Shipments of pig irons are close to previous levels and foundries are accepting all tonnages, seeking to build reserves.

Chicago—Foundrymen are ordering relatively little pig iron for post-strike delivery. Chokepoint in operations is coke. Several Chicago

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uced casting purchases. Two-day
ndry operations are not uncom-
n.

St. Louis—Koppers Co. may blow its B furnace in two weeks. Options at 60 per cent of capacity last two months have cut its ound stocks sharply. Coke supplies adequate for another month at present rate, and some good cok- coal is obtainable, though at an ost prohibitive premium price. tober pig iron sales here were the t since March.

San Francisco—Producers of cast-s, drop forgings and steel wheels icipate a severe shortage of pig n. A lengthy period will elapse er the strike before the flow of iron returns to normal. Supplies iron in the hands of several big ps is sufficient for normal produc-n into December.

Iron Ore . . .

Iron Ore Prices, Page 188

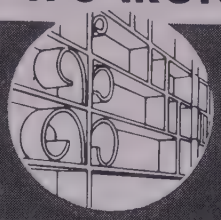
Cleveland—The Bethlehem pension eement has not changed the tie-up lake ore shipping. Ore freighters remain idle until ore miners re-n to work and, even then, weather ditions and furnace stocks will ermine the number of vessels that return to service for possibly a ximum of two trips. Stocks to-ed about 45,356,000 tons Oct. 1 pared with 40,923,499 tons a year Consumption during October s negligible compared with 7,-,055 tons in October, 1948. Ship-g of ore had begun to taper prior the strike as the normal sequence a decline in consumption. Ship-ts during the week ended Oct. 31 ounted to 15,523 tons, all from anaba. A small tonnage which been held on dock at Marquette being brought down. Canadian ts shipped 47,130 tons during the l week of October. Total ship-ts for the season through last th came to 68,275,856 tons against 69,478 tons for the like period a r ago.

Refractories . . .

Refractories Prices, Page 188

Cleveland—Refractory interests an-pate spirited demand for furnace k once the steel strike ends. All is last week pointed to a rush of cifying against suspended orders materials needed to put furnaces shape to resume production. Post-ke repair work likely will be ex-sive. Last week one district steel-ker started to specify delivery inst orders suspended at the out-ak of the strike. All steelmakers e contracts with suppliers for re-tories to be delivered over speci- periods. These contracts cover terials needed for normal repair k. In view of the added repairs ly to result from the strike sus-sion, it would not be surprising hese standing refractory contracts e enlarged substantially.

IF IT'S IRON OR STEEL



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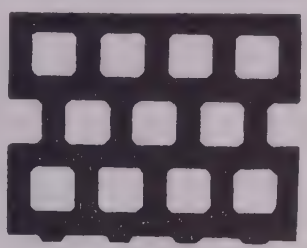

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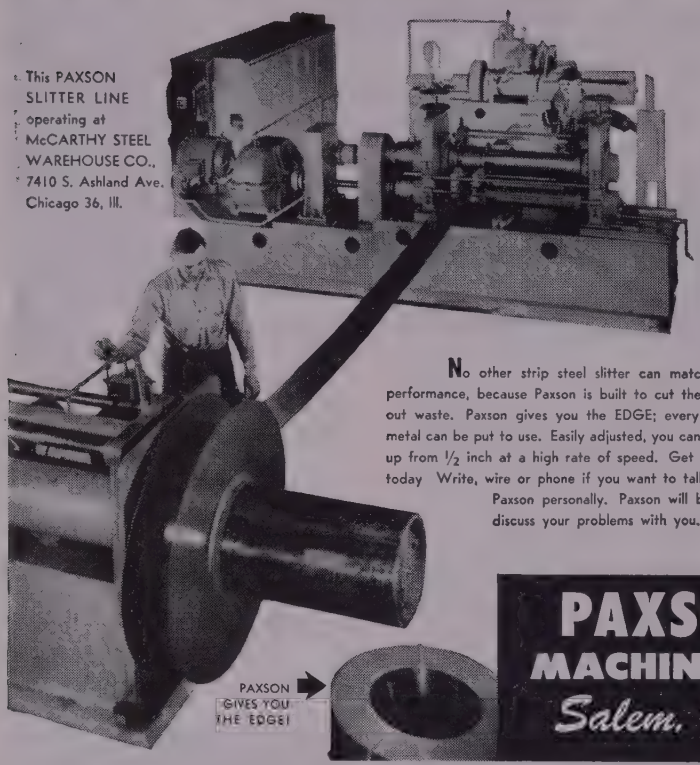

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Scrap . . .

Stronger price tone develops broad front. Some railro scrap items rise $1 to $3

Scrap Prices, Page 192

Pittsburgh—A stronger price to has developed in the scrap mark and moderately higher price lev are expected when leading consume resume operations. Dealers are ho ing on to what little scrap they ha been accumulating in speculation higher prices. Some mills are al to pick up small lots of No. 1 hea melting at $29 and remote mater is being delivered at $30, up $1. Son indication of the probable trend prices is revealed on awards of ra road items last week to Valley co sumers at $1 to $3 above previo lists. None of these items went consumers here. No activity is not in cast iron. Crushers' buying pric on machine and mixed borings ha been raised to a range of $21.50 $22, while short shovel turnings ha advanced to $23 to $24.

Philadelphia—With prospects for return to fairly normal steelmaki operations in this district short steel scrap prices are stronger. Tra ing is featured by a substantial o der for No. 1 heavy melting steel $25, delivered, or about the prestri level. On some of the older orde brokers and dealers are now ha ing to cover at as much as they so the tonnage for.

Some trading is noted in oth major open-hearth grades, with No heavy melting and No. 1 busheli at $23, No. 1 bundles at $25, and N 2 at $22. Machine shop turnings a short shovel turnings are unchang although mixed borings and turnin have advanced to $16. Cut structura are higher at $25-$26 and electric fu nace bundles and heavy turnings $25.

Bethlehem Steel Co. is expected issue releases against old orders m mentarily. Meanwhile, it is movi in fairly substantial quantities scrap which it has been holding u der demurrage on cars from indu trial producing plants which lack storage space.

Cast grades are generally high with No. 1 cupola at $35, delivere No. 1 machinery cast, $38-$39; char ing box and heavy breakable ca $35; unstripped motor blocks, $3 clean auto cast $38-$39; No. 1 whee $38; malleable $37. There has be some trading in all lines.

Boston — Steelmaking scrap firmer but the better tone is not flected in cast iron grades. Turnin lag behind other steel grades. Distr steel scrap consumers are buyi carlots while for the Pittsburgh ar brokers are paying just under $ shipping point for No. 1 and $ for No. 2. District foundries showing slight interest in c grades; halted operations at Everett cast pipe foundry contribu to inactivity. For outside shipme brokers offer around $25.50 for mix cast.

New York—Brokers are advanci their buying prices, with offerings at least $20, f.o.b. shipping point, No. 1 heavy melting steel and $18 No. 2 heavy melting. They are

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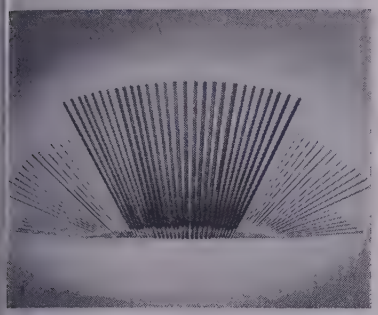

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Advertisement

fering around $16 for No. 1 busheling, $20 for No. 1 bundles and $16 for No. 2 bundles. Electric furnace bundles are higher at $20-$21, delivered. Malleable cast has jumped to $35, f.o.b. shipping point, but brokers' offerings for other cast grades are unchanged.

Buffalo—The leading local buyer of cast material has lowered bid prices $4 from prestrike levels. A steady undertone continues to rule in steelmaking items. Dealers are having little success in trying to lower prices to protect themselves against additional handling costs.

Cleveland—Stronger undertone has developed in the local scrap market with No. 1 heavy melting nominally $26.50. Upward revision is based on sales by brokers here to mills outside the district, No. 1 heavy melting having moved on the basis of $28, f.o.b. Cleveland. Republic Steel Corp. is not buying and does not expect to be in the market for shipments over the remainder of this year. Tonnage offered by railroads has declined, due partly to layoffs of many workers. Latest offerings were bought by brokers at $33 for prepared No. 1 heavy melting and $30 for unprepared material. A major railroad got $41 for malleable. Rerollers have been buying substantial tonnages of scrap rails. No. 1 cupola cast is quoted $43 to $44.

Detroit—While no substantial sales are reported, undertone of the scrap market is strong and will move further in this direction in the face of accelerated demand from mills as they return to production. Another factor will be shorter supplies from automotive plants which are cutting back or suspending operations. On the basis of current broker sentiment, the entire list is at least $1 stronger.

Cincinnati—Some scrap buying is being done, with resulting higher prices on some grades. Flow of tonnage is sluggish, with industrial scrap dwindling. Dealers are seeking heavier yard stocks in anticipation of an active market once the strikes are ended. Foundry demand is in the doldrums, with quotations on cast grades unchanged.

Chicago—Consumer prices are beginning to catch up with brokers' buying prices. Some brokers are offering $31 and over for No. 1 steel, but many dealers are unwilling to accept this figure. End of the strike may signal a rise to $35 or beyond. Dealers' yards are crammed, but scrap generation is dropping rapidly and receipts are down to a trickle.

One railroad list last week brought prices generally $3 to $4 above last month's levels. No. 1 heavy melting was awarded for just under $29 a net ton on track; rerolling rails, $40; malleable, about $32, net ton on track.

St. Louis—Prices of rail scrap have picked up under the pressure of higher demand since settlement of the six-week strike on the Missouri Pacific Railroad. Increases range from $1 on random length rails to $3 on angle bars. Cast prices are steady. Foundries are still on erratic work weeks and many tapered their scrap buying when they found the steel strike prevented their products being received in some markets. Scrap movement is heavy on the fill-

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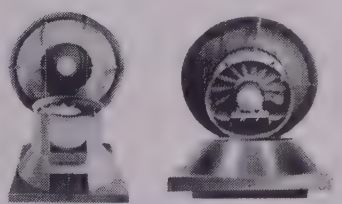

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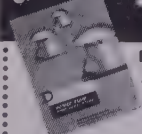

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ing of October orders which lapped into November. Considerable material moved here because it couldn't move elsewhere during the strike. Steel mills in this district now have around 60-day supply of scrap. Dealer sentiment is that the strike's end will boom the scrap market for winter buying. A $1 drop in machine turnings last week was attributed to a decline in speculative interest.

Los Angeles—Dealers look for considerably increased scrap demand when mills resume operation, but they anticipate difficulty in meeting requirements. Collections have lagged for months and stockpiles generally are low. Kaiser is buying on a substantial scale. Prices are steady.

Seattle—The scrap market is inactive and prices are unchanged. The principal buyer is not quoting and turnover has been radically reduced. Other buyers report ample offerings.

Warehouse . . .

Warehouse Prices, Page 189

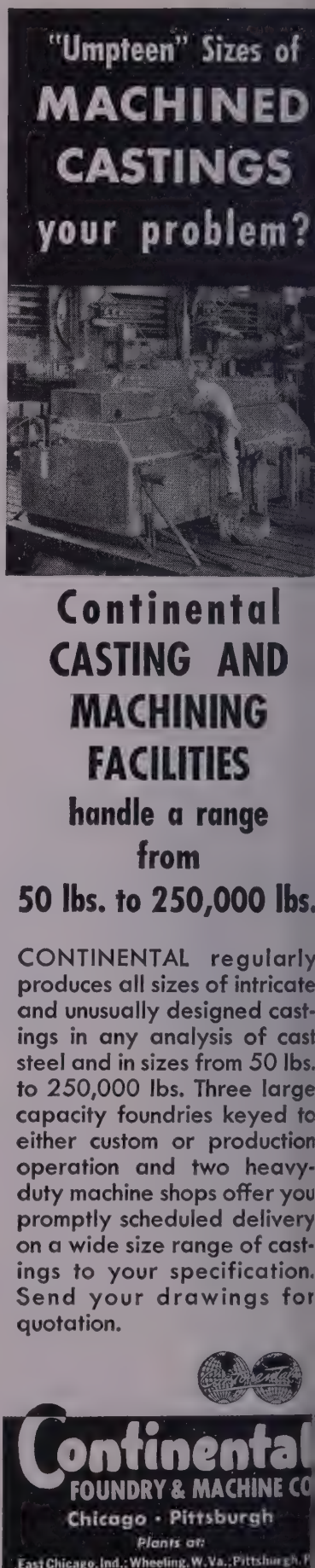
New York—Bulge in warehouse demand is spotty with drain on sheet, pipe and nail stocks heavy. Inventories of these products are depleted. Buying of bars, plates and structurals has not kept pace, although somewhat more active. Alloy stocks are not seriously taxed. In matter of replacements not too extended delay is expected in nails, but difficulty will be experienced in flat-rolled.

Pittsburgh — Those steel distributors idled since Oct. 1 should be in position to help supplement badly depleted consumer inventories once the strike issue is settled. Despite effort to ration steadily dwindling stocks, those warehouses operating throughout the strike period report flat-rolled steel items and wide flange beams no longer are available. Shipments out of warehouse stocks generally have been restricted to regular customers.

Cleveland—Local warehouse inventories in some products are badly unbalanced as result of the heavy drain over the past month. It will take jobbers 60 to 90 days to rebuild their supply position to prestrike levels. Sheet and strip stocks of some houses are virtually gone. Carbon bar supplies are somewhat better than flat-rolled, but are unbalanced. Cold-finished bar inventories are described as good but spotty and down from prestrike level. Alloys have been moving sluggishly and consequently, with supplies comfortable, no supply difficulties in this direction are anticipated. Warehouse distributors anticipate active demand for the next five to six months.

Cincinnati—Warehouse stocks are showing the effects of abnormal demands which continue. Sheets and almost all buildings items are gone from inventories. Stocks of plates are badly out of balance. A fair supply of bars remains. A strike, choking off deliveries from one major jobbing interest, is a factor in shortages.

Milwaukee—Shortages, spreading beyond cold-rolled, galvanized and hot-rolled sheets, have developed with some distributors. Plates as thick as 5/8-inch are running low and stringency is greater as thickness is reduced. Spot shortages in wide flange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ams also have developed. Some arehouse customers report no uble in obtaining requirements of t bars, cold flats, plates and some gles.

Los Angeles — Warehouse sales lged during the first two weeks of e steel shutdown, but activity has lined to a level 15 to 20 per cent er that pre-strike. Warehouse cks of flat-rolled carbon products low.

San Francisco—Jobbers' stocks are wly dwindling. Flat-rolled items getting relatively scarce, but intories of most other lines are in od balance.

Seattle—Jobbing turnover is spot- Consumers have replenished cks and consequently warehouse cks are down. Materials available being allocated to the best adntage in serving regular customers.

olts, Nuts . . .

Bolt, Nut, Rivet Prices, Page 188

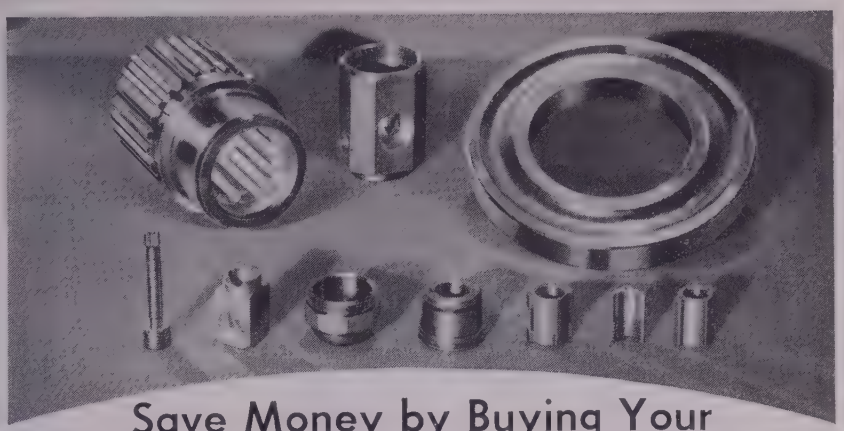
New York—Bolt and nut plants, t adversely affected by strikes, are nfronted with substantial inquiry. any of the larger bolt and nut kers have been down, with a reit that demand is being focused on ose who have been able to keep ing. Most of the latter are still erating on a single shift basis.

Pittsburgh — Strikebound producs of fasteners have lost considerle business to nonstruck competiers. Prior to Oct. 1, fastener proucers had experienced a moderate provement in order volume, alough operating schedules continued range between 3 to 4 days per ek. Competitive conditions are ely to prevent producers from ssing along increased wage costs form of higher prices. An "off the ttern" labor contract settlement s been reached between Pittsburgh rew & Bolt Co. and CIO-Steelrkers.

Cleveland—Industrial fasteners deand is active with those plants not osed by strikes. Only one major lt and nut plant in this area is rikebound, that of Republic Steel rp. All other producers are mainning operations, but they are beining to encounter steel inventory ficulties. Some order cutbacks and oldups" have been received but se have not materially affected oduction schedules since canceled nages are diverted promptly to ier needy users. Expectations are ur to eight weeks will elapse after e steel strike ends before fastener oducers' steel inventories are back where they were pre-strike. The ce tone of the fasteners market is rm with cap screws definitely onger. Weakness on the latter is orted repidly disappearing.

anada . . .

Toronto, Ont. — Canadian productn of primary iron and steel prodts totaled 259,887 net tons in July mpared with 321,401 tons in June d 276,260 tons in July, 1948. Total pped for sale in July amounted to ,658 net tons against 225,468 in e and 206,243 in July, 1948. During July shipments included



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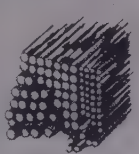

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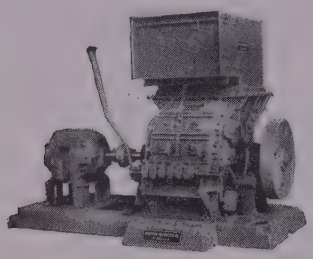

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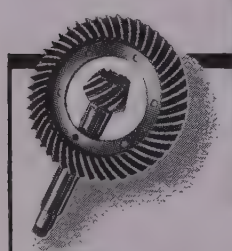

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928 to pressing, forming and sta
ing plants; 21,862 to merchant t
products; 24,831 to building const
tion; 15,096 to the container in
try; 7865 to agricultural equipm
9375 to the automotive indus
7691 to machinery plants; 1020
shipbuilding; 6340 to mining, lumi
ing, etc., and 931 to miscellaneous
dustries. Wholesalers and wareh
ing accounted for 25,963 tons and
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640 tons, School No. 165, Queens, New Y
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Bronx, New York, to Schacht Steel
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300 tons, sewage plant building, Nut Is
Boston, to Groisser & Shlager Iron W
Somerville, Mass.; Thomas O'Connor
Cambridge, general contractor.

275 tons, Boston Museum of Science buil
Boston, to A. O. Wilson Structural
Co., Cambridge, Mass.; George B.
Macomber Co., Boston, general contract

250 tons, school, Chappagua, N. Y., to Co
Iron Works.

210 tons, state bridge, Madison county,
York, to American Bridge Co., Pittsbu

175 tons, St. Francis School, Long Island
N. Y., to Weatherly Steel Co., Weath
Pa.

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1500 tons, estimated, New York University
center, Washington Square, New York;
vised plans up for bidding Nov. 15.

1200 tons, Columbia river bridge; bid
U. S. Engineer, Nov. 8.

820 tons, School No. 12, Brooklyn, N. Y.;
closed Oct. 31.

780 tons, School No. 175, Brooklyn, N.
T. G. K. Construction Co., New York,
on general contract.

700 tons, Washington state bridge, Co
river; bids soon to Olympia.

650 tons, two steel stringer bridges, one
girder bridge, one plate girder bridge
pedestrian overpass, state highway pro
Leominster, Mass.; bids Nov. 8, Bosto

425 tons, School No. 249, Brooklyn, N.
Lawrence J. Rice Construction Co.,
York, low on general contract.

360 tons, state highway bridge, Attle
Mass.; bids in.

285 tons, angles Navy Department, inv.
delivery western yards; bids Nov. 16.

175 tons, including 75 tons reinforcing
relocation 17.8 miles Spokane, Portlan
Seattle Railway; bids to U. S. Engi
Walla Walla, Wash., Dec. 6.

45 tons structural steel and 28,850 square
of steel sheet piles, section of state road
Newark, N. J.; bids Nov. 17.

Unstated tonnage, Public School No.
Brooklyn, N. Y.; bids Nov. 12.

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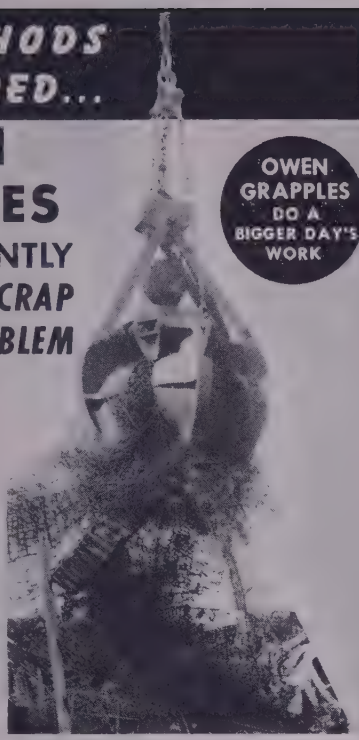

OWEN GRAPPLES DO A BIGGER DAY'S WORK

Maximum penetration into scrap assures capacity grabs which are held and lifted in an inescapable grasp.

Independent action permits entire closing power to be concentrated on one tine or distributed among tines where it is most effective. Write for the catalog.

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NEW DOUBLE PURPOSE PRESS

Available in two sizes 6" and 12" throat depth

low you can punch holes of various shapes as rge as 4" diameter in 16 gauge steel—also blank, raw, emboss, form,—all with the new DI-ACRO unch. It is ideal for both experimental and production work.

The precision ground triangular ram of this double rpose press prevents punch head from turning, suring perfect alignment at all times.

A Turret Stripper of exclusive DI-ACRO design tomatically strips material from punches of all apes. Roller Bearing cam action develops 4-ton ressure with minimum effort. Adjustable gauges sure exact location of holes.

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ives the full story of the DI-ACRO Punch, and also I-ACRO Benders, Brakes, Shears, Rod Parters, Notchers, well as the new DI-ACRO Vari-O-Speed Powershear and ydra-Power Bender.

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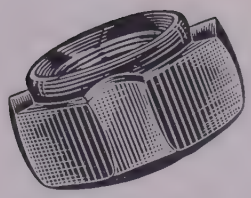
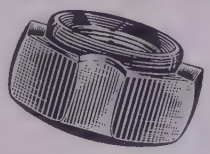
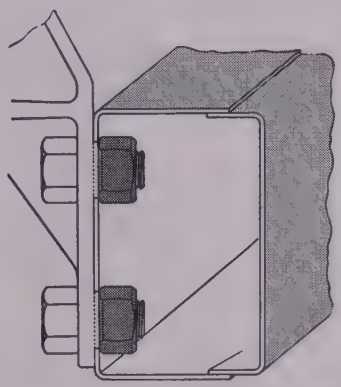


MIDLAND WELDING NUTS



for SPEED and ECONOMY in Assembly of Any Combination of Metal Stampings...



FOR THOSE BLIND SPOTS...

Particularly useful in positions difficult to reach in assembly as shown in this illustration.

SELF LOCATING QUICKLY POSITIONED

The Midland Welding Nut can be readily assembled to parts, either as a subassembly or on line assembly. Where parts can be handled fast enough a feeding mechanism can be attached to the welding machine for maximum speed in assembly.

Investigate! You may be able to use Midland Welding Nuts profitably. Write, wire or phone us today.

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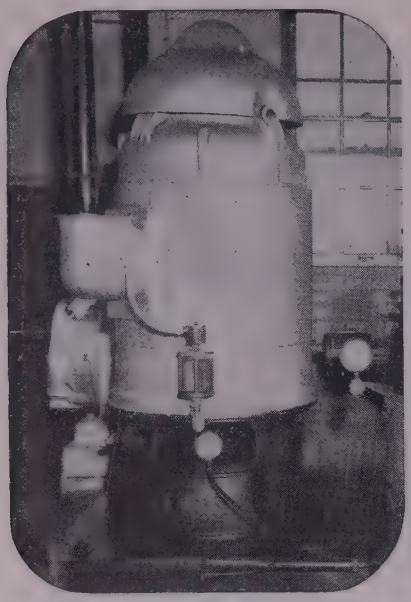
WORLD'S LARGEST MANUFACTURERS OF AUTOMOBILE FRAMES—



What About THE WAY THEY ARE INSTALLED

About 98 percent of a well water system is an underground construction project. Just how good the materials used are, or how poor the well was built, cannot be adequately checked by anyone in your organization. It is a question of depending on the reputation, integrity and skill of the builder.

First, Layne uses well building methods obtained from nearly three quarters of a century of world-wide experience. And second, everything used: casing, shutter screen, shafting, bearings, impellers, motors and controls are of the very finest quality. And furthermore, Layne well water systems are built to produce greater volumes of water than can be obtained from the conventional type of installation.

Layne's "know how" omits guess work and patch ups in construction errors by the less experienced. After the installation has been accepted, you have the long established and responsible Layne organization on which you can depend for repairs, parts or service when and if ever needed. For further information, catalogs, etc., address, LAYNE & BOWLER, INC., General Offices, MEMPHIS 8, TENN.

LAYNE

WELL WATER SYSTEMS

ASSOCIATED COMPANIES: Layne-Arkansas Co., Stuttgart, Ark. ★ Layne-Atlantic Co., Norfolk, Va. ★ Layne-Central Co., Memphis, Tenn., ★ Layne-Northern Co., Mishawaka, Ind. ★ Layne-Louisiana Co., Lake Charles, La. ★ Louisiana Well Co., Monroe, La. ★ Layne-New York Co., New York City ★ Layne-Northwest Co., Milwaukee, Wisc. ★ Layne-Ohio Co., Columbus, Ohio ★ Layne-Pacific, Inc., Seattle, Wash. ★ The Layne-Texas Co., Ltd., Houston, Texas ★ Layne-Western Co., Kansas City, Mo. ★ Layne-Minnesota Co., Minneapolis, Minn. ★ International Water Corporation, Pittsburgh, Pa. ★ International Water Supply, Ltd., London, Ont., Can. ★ Layne-Hispano Americana, S. A., Mexico, D. F. General Filter Company, Ames, Iowa

Seattle; Anderson Bridge Co., Seattle, general contract.

140 tons, Skokie river bridge, Chicago, to United States Steel Supply Co., that city.

113 tons, building, Farm Bureau Co-operative Association, Columbus, O.; to Pollock Steel Co., Cincinnati.

REINFORCING BARS PENDING

2250 tons, Garrison Dam, Bismarck, N. D., U. S. Engineer; bids in Oct. 26.

1100 tons, Benson storm sewer, Omaha, Neb.; bids asked.

461 tons, research hospital, University of Illinois, Chicago; bids asked.

300 tons, grade separation, Edens Superhighway, Chicago; bids asked.

250 tons, building, Certain-Teed Products Co., Clinton, Iowa; bids asked.

225 tons, Central street overhead crossing, Marshalltown, Iowa; bids asked.

195 tons, apartment building, Chicago; bids asked.

150 tons, Illinois state reformatory, Sheridan, Ill.; bids asked.

110 tons, Northern Illinois State Teachers College, Dekalb, Ill.; bids asked.

PLATES . . .

PLATES PLACED

1417 tons, Navy Department, Washington, to Central Iron & Steel Co., Harrisburg, Pa., $132,798.54.

PLATES PENDING

800 tons, Navy Department, east and west yards, inv. 1972; bids Nov. 22.

PIPE . . .

CAST IRON PIPE PLACED

1200 tons, 6 and 8-inch, Attleboro, Mass., to United States Pipe & Foundry Co., Burlington, N. J.

500 tons, 36-inch, water line, Metropolitan District Commission, Malden-Saugus, Mass., to United States Pipe & Foundry Co., Burlington, N. J.

300 tons, treatment plant project, Bremerton, Wash., to H. G. Purcell, Seattle, for U. S. Pipe & Foundry Co., Burlington, N. J.

CAST IRON PIPE PENDING

2400 tons, 6 to 12-inch, Templeton, Mass., R. D. Wood Co., Florence, N. J., low.

125 tons, also hydrants, etc., 4 and 6 inch; bids in Nov. 1 to Anita Busch, clerk, Edmonds, Wash.

RAILS, CARS . . .

LOCOMOTIVES PENDING

Illinois Terminal, directors have authorized purchase of nine diesel-electric locomotives.

New York Central, unstated number of diesel-electric locomotives, serial contract No. 28-1949; bids Nov. 14.

Pennsylvania-Reading Sea Shore Lines, unstated number diesel-electric locomotives; bids Nov. 7.

RAILROAD CARS PLACED

Great Northern, 66 passenger cars awarded, 30 sleepers to Pullman-Standard Car Mfg. Co., Chicago, and 6 coaches, 6 diners, 6 coffee shop cars, 6 observation cars, 6 baggage cars and 6 baggage-mail cars to American Car & Foundry Co., New York.

RAILROAD CARS PENDING

Great Northern, 500 refrigerator cars contemplated.

RAILS PLACED

St. Louis-San Francisco, 27,500 tons, to Tennessee Coal Iron & Railroad Co., Birmingham. Order will be sufficient to lay 75 miles of 132 lb rail and 50 miles of 115 lb rail.

RAILS PENDING

Navy Department, 350 tons, Earle, N. J.; bids Nov. 21, Navy Purchasing Office, New York, inv. 5730.

New York Central, estimated 75,000 tons; bids Nov. 7.

CONSTRUCTION AND ENTERPRISE

ALABAMA

TUSKEGEE, ALA.—Veterans Administra Washington, has awarded a $208,903 con to Whaley Co., Birmingham, for cons tion of an outside steam distribution sy for the V-A hospital in Tuskegee.

CONNECTICUT

PORTLAND, CONN.—Pickering Governor manufacturer of governors, has been quired by Henry & Wright Division, H ford-Empire Co. Effective Nov. 14 m facturing and sales will be handled Henry & Wright headquarters, 760 Wir St., Hartford, Conn.

OHIO

ALLIANCE, O.—This city is being consid as a possible site of a new industry. Ge Scheffey, head, Brooks Press Co., pres located in Lansdale, Pa., said he is see a building of approximately 6000 sq ft. firm is engaged in manufacture of high s punch presses and the stamping busine

ASHTABULA, O.—Ashco Industrial Water has been incorporated and is consid plans for construction of a pumping sta estimated cost $300,000, one and one miles east of the mouth of the Ashta river. This station would furnish raw water to members of the company. At present time there are only two mem National Distillers Chemical Corp. and H er-Detrex Corp., whose plants are being structed on State road. Incorporators listed as Charles D. Johnson, W. R. nelly and John D. Drinko.

CLEVELAND—Uniworld Research Corp. America has been established at 1302 tario St. by Karl Spitz. The company to license steel companies to make a steel alloy.

CLEVELAND—Morrison Industries Inc. been formed by John R. Morrison, 2976 chester Rd., one of the principal owners, attorneys Gordon F. Basler and Ken Meyers. The new firm will manufactur dustrial heating equipment.

CLEVELAND — L. L. Copeland, Fairm Steel Co., 3030 Euclid Ave., has inco ated the business under the name of mount Steel Corp. The company will in all kinds of steel.

MT. GILEAD, O.—Hydraulic Press Mfg. has been awarded a contract by Nat Tube Co., Pittsburgh, for construction large hydraulic press. The press will pipe up to 36 inches in diameter, 40 long with a ½-inch wall thickness.

CLEVELAND—Joseph A. Busher of Dial & Die Co., 3500 Lakeside Ave., has fo a new corporation, the Jetrow Co., will manufacture a hand lift truck. new firm will start operations in abo month at 3500 Lakeside.

CONNEAUT, O.—Cleveland Electric Illum ing Co., Cleveland, is expected to begin struction work soon on a new substatio Chestnut street, between the New Central Railroad tracks and Jackson st

FOSTORIA, O.—Fostoria Screw Co. Inc., corporation which has taken over the toria Screw Co., plans to close Plant cated on S. Union street, and consol the manufacturing operations in Plant Poplar & Fourth Sts. The purchasing pany, Rose-Moskowitz group in Cincir has elected the following officers: S. G. president; T. L. Moskowitz, vice presi A. J. Buthkes, second vice president; Weiland, secretary; and Joseph Ho treasurer, all of Cincinnati. H. E. T general manager, will continue in the capacity.

UTAH

SALT LAKE CITY, UTAH—Work on th jor portion of Salt Lake Refining Co. million expansion program will begin M The company is a subsidiary of Sta

PRESENTING . .

KARRI-GO!
INDUSTRIAL CRANE

The World's Finest
5-Ton Front Boom Crane
At The World's
Lowest Price

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ILENT HOIST & CRANE CO. 849 63rd ST., BROOKLYN 20, N.Y.

COPPER—BRASS—BRONZE
PERFORATED
TO YOUR REQUIREMENTS

PERFORATED METALS
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ARCHITECTURAL GRILLES

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TIN PLATE
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THE MODERN TIN PLATE

WHEELING STEEL CORPORATION
WHEELING, WEST VIRGINIA

Finished, Assembled Parts
Represent TRUE Costs

ELECTRIC FURNACE
STEEL CASTINGS

Steel castings produced true to pattern—sound and clean, readily fitted to jigs, machinable in a minimum of time and quickly assembled into your equipment—represent the ONLY actual and true cost of steel castings.

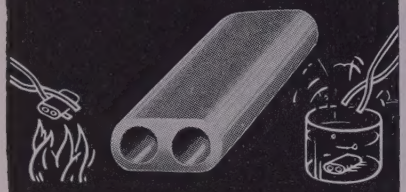
We furnish this quality of product. And, by cooperating with your engineers in matters of design and pattern construction, assist you to secure castings of minimum weight, maximum strength and utmost economy of machining and assemblage.

Quality controls throughout our plant assure consistent uniformity, thorough dependability and a product that is economical to use in your equipment; whether it be ships, turbines, trucks, railroad equipment or what-not.

CRUCIBLE STEEL CASTING CO.
LANSDOWNE, Del. Co., PENNA.

Be Certain WITH "SERV-RITE"

THERMOCOUPLE INSULATORS



This Gordon Thermocouple Insulator, heated red hot and plunged into cold water, came out just as good as new

Available only through GORDON, Serv-rite Thermocouple Insulators are made to stand the gaff of excessive thermal shock far above normal requirements.

For sturdy and reliable thermocouple insulator performance to meet peak production needs — Specify Serv-rite...a Gordon development backed by 32 years' experience in supplying industry with insulators that last longer and give better results.

Serv-rite Thermocouple Insulators—in any type or size—can be supplied immediately from Gordon's large stocks in the Chicago and Cleveland Plants. Remember—you can always distinguish Serv-rite Insulators by their *tan* color.

Fish Spine Beads — **Asbestos String**
Asbestos Tubing — **Single Hole**
Double Hole Round — **Double Hole Oval**

CLAUD S. GORDON CO.

Specialists for 32 Years in the Heat Treating and Temperature Control Field

Dept. 14 • 3000 South Wallace St., Chicago 16, Ill.
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Oil Co. of California. Groundwork for the new refining plant already is completed. The main structure will be a catalytic cracking unit which will greatly increase western production of high octane gasoline.

WISCONSIN

MADISON, WIS.—International Harvester Co. has been granted a permit by building inspection superintendent Ray F. Burt to erect a warehouse, estimated cost $180,000, at 2320 Darwin Rd.

MILWAUKEE—Work is expected to start soon on a $180,000 addition to the Standard Supply Co., 1045 N. Fifth St., and bids are being taken. It will occupy a vacant lot adjoining the present building.

FERROALLOYS

(*Concluded from Page* 189)

Silicon Metal: (Min. 97% Si and 1% max. Fe). C.l., lump, bulk, regular 19.0c per lb of Si, c.l. packed 20.2c, ton lot 21.1c, less ton 22.1c. Add 1.5c for max. 0.10% calcium grade. Deduct 0.4c for max. 2% Fe grade analyzing min. 96% Si. Spot, add 0.25c.

Alsifer: (Approx. 20% Al, 40% Si, 40% Fe). Contract, basis f.o.b. Niagara Falls, N. Y., lump, carload, bulk, 7.40c per lb of alloy, ton lots packed 8.80c, 200 to 1999 lb 9.15c, smaller lots 9.65c. Delivered. Spot up 0.5c.

Briquetted Alloys

Chromium Briquets: (Weighing approx. 3⅜ lb each and containing exactly 2 lb of Cr). Contract, carload, bulk, 13.75c per lb of briquet, carload packed 14.45c, ton lot 15.25c, less ton 16.15c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Ferromanganese Briquets: (Weighing approx. 3 lb and containing exactly 2 lb of Mn). Contract, carload, bulk 10.45c per lb of briquet, c.l. packaged 11.25c, ton lot 12.05c, less ton 12.45c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Silicomanganese Briquets: (Weighing approx. 3½ lb and containing exactly 2 lb of Mn and approx. ½ lb of Si). Contract, c.l. bulk 10.30c, per lb of briquet, c.l. packaged 11.1c, ton lot 11.9c, less ton 12.8c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Silicon Briquets: (Large size—weighing approx. 5 lb and containing exactly 2 lb of Si). Contract, carload, bulk 6.15c per lb of briquet, c.l. packed 6.95c, ton lot 7.75c, less ton 8.65c. Delivered. Spot, add 0.25c.

(Small size—weighing approx. 2½ lb and containing exactly 1 lb of Si). Carload, bulk 6.30c, c.l. packed 7.10c, ton lots 7.90c, less ton 8.80c. Delivered. Add 0.25c for notching, small size only. Spot, add 0.25c.

Molybdic-Oxide Briquets: (Containing 2½ lb of Mo each) 95.00c per pound of Mo contained. F.o.b. Langeloth, Pa.

Calcium Alloys

Calcium-Manganese-Silicon: (Ca 16-20%, Mn 14-18%, and Si 53-59%). Contract, carload, lump, bulk 19.25c per lb of alloy, carload packed 20.05c, ton lot 21.55c, less ton 22.55c. Delivered. Spot, add 0.25c.

Calcium-Silicon: (Ca 30-33%, Si 60-65%, Fe 1.50-3%). Contract, carload, lump, bulk 17.9c per lb of alloy, carload packed 19.1c, ton lot 21.0c, less ton 22.5c. Delivered. Spot add 0.25c.

Titanium Alloys

Ferrotitanium, Low-Carbon: (Ti 20-25%, Al 3.5% max., Si 4% max., C 0.10% max.) Contract, ton lots 2" x D, $1.40 per lb of contained Ti; less ton $1.45. (Ti 38-43%, Al 8% max., Si 4% max., C 0.10% max.) Ton lot $1.28, less ton $1.35, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis. Spot, add 5c.

Ferrotitanium, High-Carbon: (Ti 15-18%, C 6-8%). Contract $160 per net ton, f.o.b. Niagara Falls, N. Y., freight allowed to destination east of Mississippi river and north of Baltimore and St. Louis.

Ferrotitanium, Medium-Carbon: (Ti 17-21%, C 3-4.5%). Contract, $175 per ton, f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed.

Vanadium Alloys

Ferrovanadium: Open-Hearth Grade (Va 35-55%, Si 8-12% max., C 3-3.5% max.). Contract, any quantity, $2.90 per lb of contained Va. Delivered. Spot, add 10c. **Crucible-Special Grades** (Va 35-55%, Si 2-3.5% max., C 1% max.), $3. **Primos and High Speed Gr** (Va 35-55%, Si 1.50% max., C 0.20% ma $3.10.

Grainal: Vanadium Grainal No. 1, 93c; N 63c; No. 79, 45c, freight allowed.

Vanadium Oxide: Contract, less carload $1.20 per lb of contained V_2O_5, freight lowed. Spot, add 5c.

Tungsten Alloys

Ferrotungsten: (70-80%). Contract, 10,00 W or more, $2.25 per lb of contained 2000 lb W to 10,000 lb W, $2.35; less t 2000 lb W, $2.47. Spot, add 2c.

Tungsten Powder: (W 98.8% min.). Cont or spot, 1000 lb or more, $2.90 per lb of tained W; less than 1000 lb W, $3.

Zirconium Alloys

12-15% Zirconium Alloys: (Zr 12-15%, Si 43%, Fe 40-45%, C 0.20% max.). Contr c.l., lump, bulk 6.6c per lb of alloy, c.l. pac 7.35c, ton lot 8.1c, less ton 8.95c. Delive Spot, add 0.25c.

35-40% Zirconium Alloy: (Zr 35-40%, Si 52%, Fe 8-12%, C 0.50% max.). Contr carload, lump, packed 20.25c per lb of a ton lot 21c, less ton 22.25c. Freight allo Spot, add 0.25c.

Boron Alloys

Ferroboron: (B 17.50% min., Si 1.50% m Al 0.50% max., C 0.50% max.). Contr 100 lb or more. 1" x D, $1.20 per lb of loy. Less than 100 lb $1.30. Delivered. S add 5c. F.o.b. Washington, Pa., prices lb and over are as follows: Grade A 14% B) 75c per pound; Grade B (14-18% $1.20; Grade C (19% min. B) $1.50.

Borosil: (3 to 4% B, 40 to 45% Si), $4.25 lb contained B, f.o.b. Philo, O., with fre not to exceed railroad freight allowed to tination.

Bortam: (B 1.5-1.9%). Ton lots, 45c per smaller lots, 50c per lb.

Carbortam: (B 0.90 to 1.15%). Net to carload, 8c per lb, f.o.b. Suspension Bri N. Y., freight allowed same as high-ca ferrotitanium.

Other Ferroalloys

Ferrocolumbium: (Cb 50-60%, Mn 5% m Si 8% max., C 0.5% max.). Contract, ton 2" x D, $2.90 per lb of contained Cb, less $2.95. Delivered. Spot, add 25c.

CMSZ Mixes: (No. 4—Cr 45-49%, Mn 4- Si 18-21%, Zr 1.25-1.75%, C 3-4.5%; No. Cr 50-56%, Mn 4-6%, Si 13.50-16.0%, Zr 1.25%, C 3.50-5%). Carload, 12 M x D, load packed 19.0c per lb of material, to 19.75c, less ton 21.0c. Delivered.

Silcaz Alloy: (Si 35-40%, Ca 9-11%, Al 6 Zr 3-5%, Ti 9-11%, B 0.55-0.75%). Car packed, 1" x D, 43c per lb of alloy, lot 45c, less ton 47c. Delivered.

SMZ Alloy: (Si 60-65%, Mn 5-7%, Zr 5- Fe 20% approx.). Contract, carload, pac ½" x 12 M, 16.5c per lb of alloy, ton 17.50c, less ton 18.5c. Delivered. Spot, 0.25c.

Graphidox No. 4: (Si 48-52%, Ca 5-7%, T 11%). C.l. packed, 17.00c per lb of alloy; lots 18.00c; less ton lots 19.50c, f.o.b. Nia Falls, N. Y.; freight allowed to St. Louis

V-5 Foundry Alloy: (Cr 38-42%, Si 17-1 Mn 8-11%). C.l. packed, 14.25c per l alloy; ton lots 15.75c; less ton lots 17 f.o.b., Niagara Falls, N. Y.; freight allo to St. Louis.

Simanal: (Approx. 20% each Si, Mn, Lump, bulk, carload 11.00c. Ton lots, 11.50c, packed 11.75c. Less ton lots, pa 12.25c per lb of alloy, f.o.b. Philo, O., freight not to exceed railroad freight allo to destination.

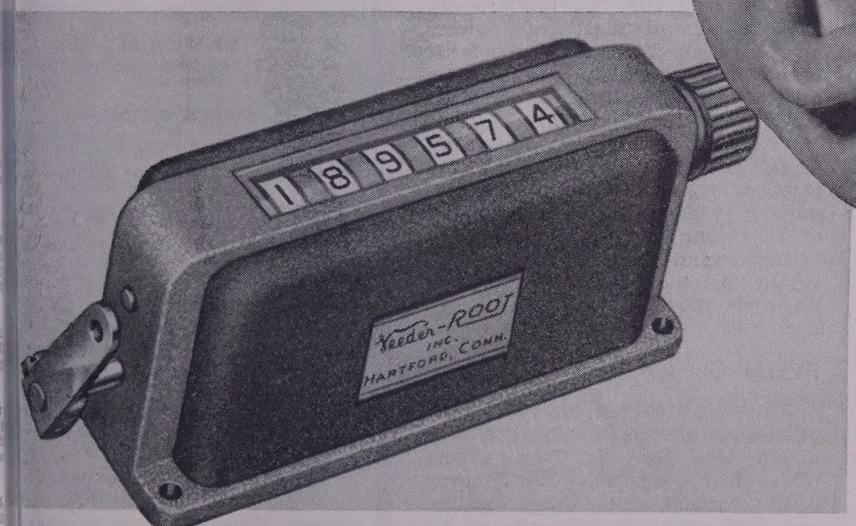
Ferrophosphorus (23-25% based on 24% P tent with unitage of $3 for each 1% above or below the base); Gross tons per load, f.o.b. seller's works, Mt. Pleasant Siglo, Tenn., $65 per gross ton.

Ferromolybdenum: (55-75%). Per lb, tained Mo, f.o.b. Langeloth and Washin Pa., furnace, any quantity $1.10.

Technical Molybdic-Oxide: Per lb, cont Mo., f.o.b. Langeloth and Washington, packed in bags containing 20 lb of m denum, 95.00c.

"Are you telling Me hat I don't know how to Count?"

—exploded the chief engineer



O SIR, chief — not *you!* Only nt to suggest that your swell new achine might do itself much prouder, lswise, if it only — so to speak — d "learn to count." That's all. *ut that's a lot!* Many machines that e been "taught to count" . . . with eeder-Root Counter built-in as inal equipment . . . have shown e startling sales-spurts. For this ique feature gives any product a usefulness, a new sales appeal, a new distinction from competition. And there *are* golden probabilities that *your own product* has hidden talents in functional service which a built-in Veeder-Root Counter can build up into something big. Such talents may hide themselves from you . . . but not from the creative, mathematical eye of a Counting House engineer. He'll be glad to take a look, any time you say.

COUNTING DEVICES

NEW GENERAL-PURPOSE COUNTER

is modern, streamlined, compact . . . fits readily into most design-limits. Attractive to look at, easy to read. Send for 8-page Condensed Catalog and complete spec-sheet on this counter, No. 1260. Write to

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In Canada: Veeder-Root of Canada, Ltd., 955 St. James Street, Montreal 3. *In Great Britain:* Veeder-Root Ltd., Kilspindie Road, Dundee, Scotland.

Behind the Scenes...

Still Waiting

As you could readily see from last week's issue, our boys were right on the scene at the big CIO shindig here in Cleveland. During the hubbub in the publicity office one day, the phone rang and the gal at the desk, after listening for a minute or two to what apparently was a question she couldn't answer, told the caller to hang on for just a second and she'd get the answer right away. Laying down the receiver, she just darted off to track down someone who could come to her rescue. One of our boys noticed all this and was curious to see what the upshot would be so he hung around. Five minutes passed, then ten, and finally a half hour had gone by and the receiver still lay on the desk, picking up the babel of the packed room and undoubtedly driving the guy on the other end slightly whacky. And now you're going to get sore at us, because we don't know how it all came out. Our hard working editor had to dash off on something else and for all he knows that fellow is still waiting on the other end of the line for the right answer. As a matter of fact, that little episode isn't too far different from the way a lot of you must feel about some of your labor problems today. Sort of waiting the thing out, wondering perhaps what the right answer is, and hoping that somebody comes up with it soon.

Guide on Pensions

Speaking of labor problems, we have a new supply of Walt Campbell's outstanding Guide to Metalworking Executives on Pension and Insurance Plans, and can also furnish you with his analysis of the pension problems facing the smaller plants. Readers Service Department will take care of you on either or both.

Newspeak

We continue to be fascinated by that new book, "Nineteen Eighty-Four", the digest of which you may have read in Readers Digest last month. As you may know it is a picture of life in London 35 years hence, at which time the world is divided into three areas, Oceania, Eurasia, and Eastasia. "Big Brother" is the dictator of Oceania, and part of his technique is a completely new language called Newspeak. Oldspeak is what we use now, although if you study some of our government lingo, the trade names of many of our good advertisers, and the jargon of our teenagers, you can see we are already using a lot of Newspeak today. In Newspeak words are not only telescoped together, most of them are eliminated entirely. **Ingsoc** is English socialism, **Minitruth** the Ministry of Truth, and **unperson** is one who no longer exists. As you know, STEEL's editors are constantly trying to give you the most information in the least amount of reading time and you may one of these days be subjected to: **Stelops curwk rept rsng. Natingrate 30%.** All of which means simply that steel operations for the current week are reported rising and the national ingot rate is now 30 per cent.

Big Steel

There have been all sorts of ways tried to depict just how big the steel industry of this country really is. Those of you who have toured some of the bigger mills on foot know for yourself that a boy scout on his 14-mile hike would need a bicycle to get all the way around, but did you ever stop to realize that the primary steel industry of this country covers approximately 74 square miles? It is equivalent to a strip of land half a mile wide running beside the Hudson River from New York City to Troy, N. Y. Within this imaginary strip would be 246 blast furnaces, 1,210 steelmaking furnaces, and approximately 15,000 coke ovens, plus all of the rolling mills and other manufacturing and shipping facilities involved in the production of the country's steel.

Puzzle Corner

The correct answer for last week's puzzler is 18 lbs, which is a nice plump bird for the Thanksgiving table. Our good friend Bill Johnson comes through with some dandies, and we'll start off with one of his toughies. Assuming you're on a sleeper on your way to New York, and not being able to sleep you lie awake counting the click of the rails. For how many seconds must you count the clicking of the rails that the number of rails counted equals the speed of the train in miles per hour, a rail being 30 feet long? Maybe that one will keep you awake even if you aren't on a train.

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